Appendix D

Harris Environmental Group, Inc.
Draft Biological Assessment
TEP Proposed Sahuarita-Nogales
Transmission Line Project
Western Corridor (HEG 2003a)

BIOLOGICAL ASSESSMENT

OF THE

TUCSON ELECTRIC POWER

SAGUARITA – NOGALES TRANSMISSION LINE

WESTERN CORRIDOR

DRAFT
15 MAY 2003

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EXECUTIVE SUMMARY

Tucson Electric Power (TEP) and Citizens Communications (Citizens) are proposing to build a new, dual-circuit, 345,000-volt (345-kV) transmission line from the TEP South Substation in the vicinity of Sahuarita, Arizona to interconnect with Citizens system at a Gateway Substation that TEP will construct west of Nogales, Arizona. From the Gateway Substation, the proposed transmission line will continue south across the United States – Mexico border for approximately 60 miles (mi) (98 kilometers [km]) into the Sonoran region of Mexico, connecting with the Comisión Federal de Electricidad (CFE, the national electric utility of Mexico) at the Santa Ana Substation. The proposed transmission line will improve Citizens' service in Nogales and allow for the transfer of blocks of electrical energy between the United States and Mexico. Southern Arizona and Sonora, Mexico have experienced rapid growth, and forecasts predict this growth will continue. Citizens' customers have already experienced outages due to limited transmission facilities into the region. TEP recognizes the need to improve transmission into the southern Arizona region and proposes to assist Citizens in meeting an Arizona Corporation Commission (ACC) mandate to improve the reliability and service of its Nogales electrical system. The ACC has ordered Citizens to improve its system by the end of 2003. The TEP Sahuarita – Nogales Transmission Line, a double-circuit 345-kV transmission line will provide the additional reliability that Citizens requires while providing additional capacity into the southern Arizona region for future needs.

This Biological Assessment (BA) was prepared to meet the requirements of Section 7 of the Endangered Species Act (ESA) of 1973, 16 U.S.C. Section 1536(a)(2). Section 7 requires all federal agencies to consult with the United States Fish and Wildlife Service (USFWS) if an action may affect listed species or their designated critical habitat. Section 7 consultation is required for any project that requires a federal permit or receives federal funding. Action is defined broadly to include funding, permitting and other regulatory actions. All activities associated with construction of the TEP Sahuarita - Nogales Transmission Line are included in the proposed action being evaluated for this BA. Because TEP has applied for a Presidential Permit to construct the transmission line across the international border, the Department of Energy (DOE) is preparing a Draft Environmental Impact Statement (DEIS) (Tetra Tech 2003) concurrently with this document.

Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. This is accomplished through consultation with the USFWS. If such species may be present, the applicant must conduct a BA to determine if a proposed action is likely to adversely affect listed species, or designated critical habitat. The USFWS will review this BA and issue a biological opinion (BO). DOE is the permitting agency for this proposed action, and therefore the lead federal agency on Section 7 consultation with USFWS.

The proposed action crosses a variety of land jurisdictions: including private, Arizona State Land Department (ASLD), Bureau of Land Management (BLM), and United States Department of Agriculture Forest Service (USFS). Because each jurisdiction has different requirements for environmental review of the proposed action, this document is subdivided by agency. SECTION 2 addresses species that receive protection under the ESA. SECTION 3 reviews the potential effects of the proposed action on those species classified as "Sensitive" by the USFS. SECTION 4 reviews the potential effects of the proposed action on those species classified as "Sensitive" by the BLM. SECTION 5 addresses those species that are considered "Wildlife of Special Concern" by the Arizona Game and Fish Department (AGFD). Because habitats often overlap different jurisdictions, many species have classifications within each agency. In these instances, the species is evaluated under the jurisdiction which affords the highest level of protection.

We contacted federal (USFWS) and state (AGFD) natural resource agencies to request information on possible special status species (sensitive, threatened, and endangered) that may exist on or near the proposed Western Corridor of the TEP Sahuarita – Nogales Transmission Line. Agency correspondence is presented in Appendix A.

SUMMARY OF DETERMINATIONS FOR FEDERALLY LISTED SPECIES

Based on contact with USFWS, USFS, BLM, and AGFD, 10 federally listed species may be affected by the proposed action. Upon review of the current status of these species, the environmental baseline of the project area, the effects of the proposed actions on the species as well as cumulative effects, the following determinations are made for the 10 affected species (Table 1).

Table 1. Effects of the proposed action on federally-listed species.

Species	Potential Effect
Mexican spotted owl	The proposed action may affect, but is not likely to adversely affect this species.
Cactus ferruginous pygmy-owl	The proposed action may affect, and is likely to adversely affect this species.
Southwestern willow flycatcher	The proposed action may affect, but is not likely to adversely affect this species.
Lesser long-nosed bat	The proposed action may affect, and is likely to adversely affect this species.
Chiricahua leopard frog	The proposed action may affect, and is likely to adversely affect this species.
Pima pineapple cactus	The proposed action may affect, and is likely to adversely affect this species.
Sonora chub	The proposed action may affect, and is likely to adversely affect this species. The proposed action may affect, but is not likely to adversely modify critical habitat for this species.
Jaguar	The proposed action may affect, but is not likely

	to adversely affect this species.
Gila topminnow	The proposed action may affect, but is not likely to adversely affect this species.
Mexican gray wolf	The proposed action may affect, but is not likely to adversely affect this species.

1.0 PROJECT DESCRIPTION

1.1 PROPOSED ACTION

The proposed TEP Western Corridor Sahuarita – Nogales Transmission Line will consist of twelve transmission line wires, or conductors, and two neutral ground wires that will provide lightning protection and fiber optic communication, on a single set of support structures. The transmission line will originate at TEP's existing South Substation, in the vicinity of Sahuarita, Arizona, and interconnect with Citizens system at a Gateway Substation that TEP will construct west of Nogales, Arizona. The double-circuit transmission line will continue from the Gateway Substation south to cross the United States – Mexico border and extend approximately 60 mi (98 km) into the Sonoran region of Mexico, connecting with the Comisión Federal de Electricidad (CFE, the national electric utility of Mexico) at the Santa Ana Substation. Figure 1 shows the overall proposed project location.

The South Substation in Sahuarita will be upgraded and expanded to provide interconnection between a new TEP 345-kV transmission line and the new Gateway Substation west of Nogales. The South Substation will be expanded by approximately 1.3 acres (0.53 ha) to add a switching device that will connect to the proposed transmission line, with a 100 ft (30 m) expansion of the existing fence line for the addition of the second 345-kV circuit. The new Gateway Substation will include a 345-kV to 115-kV power transformer to provide power to the local area. The new Gateway Substation will be constructed within a developed industrial park north of Mariposa Road (State Route 189), approximately 0.5 mi (0.8 km) east of the Coronado National Forest (CNF) boundary (Northeast ¼ of Section 12, Township 24 South, Range 13 East). The TEP portion of the site is approximately 18 acres (7.3 ha) and is within the City of Nogales, Arizona. TEP has purchased the substation site and preliminary construction activities have been completed. TEP is flexible in the placement of a fiber-optic regeneration site, but it will likely be located in the area of Township 18 South, Range 12 East, approximately 10 mi (16 km) southwest of Sahuarita on private land. The fiber optic regeneration site will consist of an approximate 0.5-acre (0.2-ha) fenced yard, containing a 10 ft (3 m) by 20 ft (6 m) concrete pad with an equipment house. The cleared area for the equipment house will be approximately 20 ft (6 m) by 30 ft (9 m). There will be three 3 acre (1.2 ha) construction staging areas (located near the South and Gateway Substations and the Interstate 19 [I-19]/Arivaca Road interchange) and an 80 acre (32 ha) temporary laydown yard (also near the I-19/Arivaca Road interchange) used during construction of the proposed line.

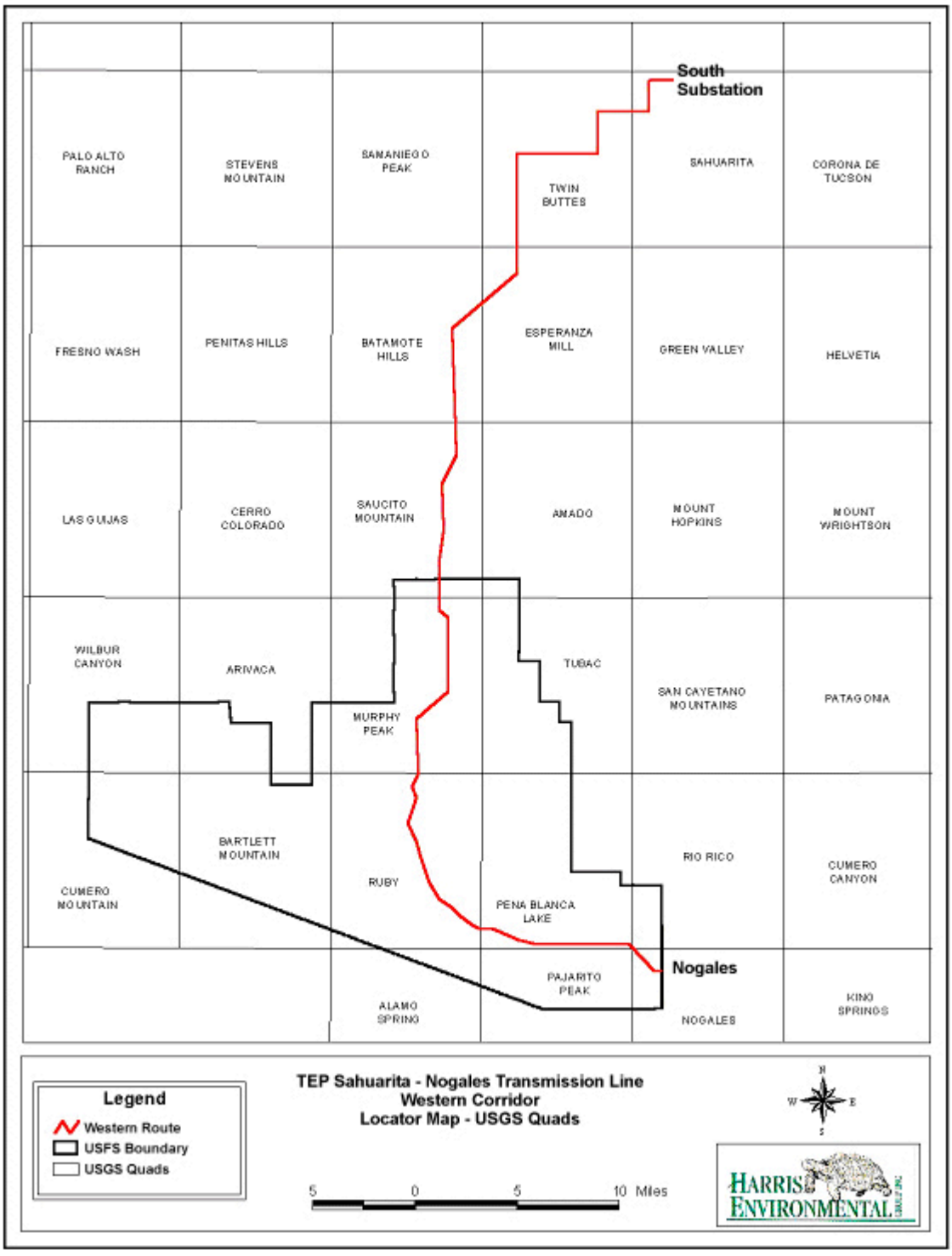

Figure 1. Map of TEP Sahuarita – Nogales Transmission Line Western

The primary support structures to be used for the transmission line are self-weathering steel single structures, or monopoles (Figure 2). Dulled, galvanized steel lattice towers (Figure 3) will be used in locations where their use will minimize overall environmental impacts, in accordance with Arizona Corporation Commission (ACC) Decision No. 64356 (ACC 2001).

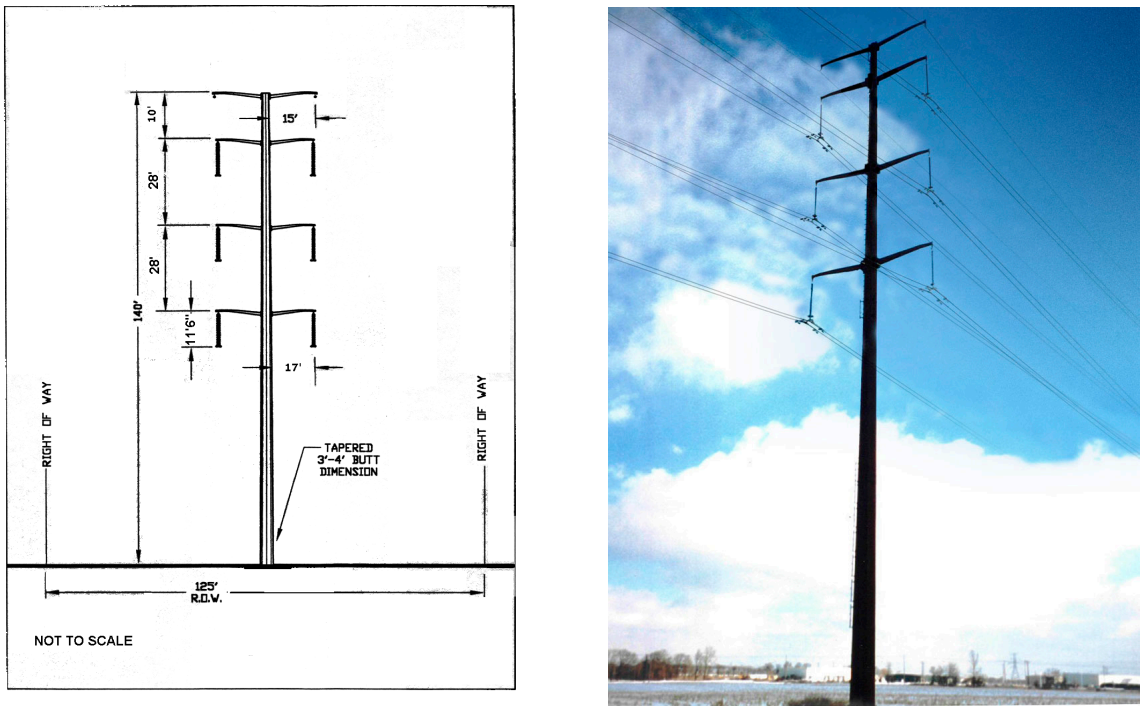

Figure 2. Monopole Transmission Line Structure Drawing and Photo.

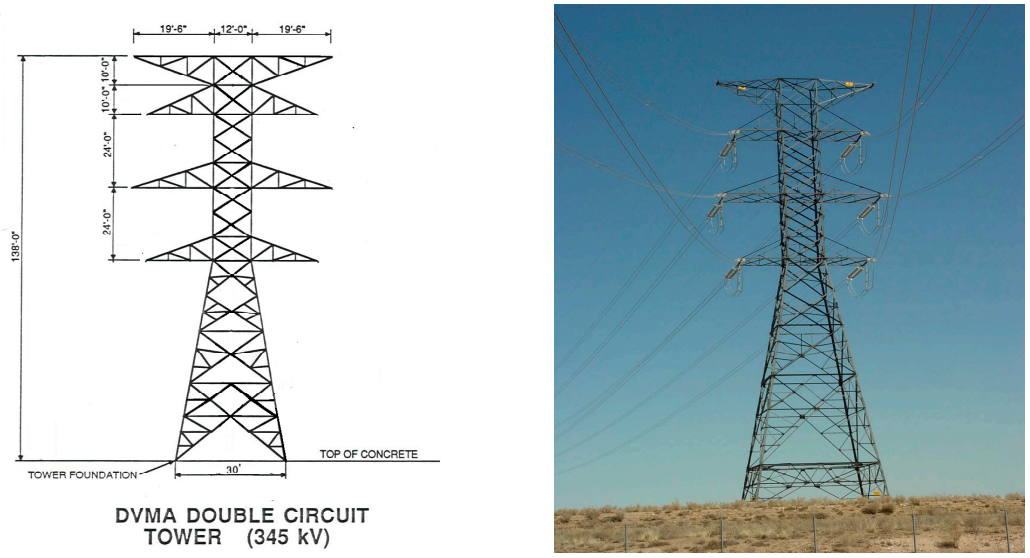

Figure 3. Lattice Tower Transmission Line Structure Drawing and Photo.

1.2 PROJECT LOCATION

The Western Corridor extends for approximately 65.7 mi (105 km), from the South Substation to the United States – Mexico border, including 9.3 mi (15 km) along the El Paso Natural Gas Company (EPNG) gasline right-of-way (ROW). The length of the Western Corridor is 29.5 mi (47.5 km) within the CNF, and approximately 1.25 mi (2.01 km) on BLM land. The Western Corridor will require approximately 446 support structures, including approximately 191 within the CNF and 9 on BLM land.

The Western Corridor exits the TEP South Substation located within the incorporated area of the Town of Sahuarita and proceeds westerly for approximately 1.0 mi (1.6 km) before turning south for 1.5 mi (2.4 km). The corridor turns west across I-19 and continues through Pima County to the southwest, crossing approximately 1.25 mi (2.01 km) of federal land managed by BLM parallel to two existing TEP transmission lines (138-kV and 345-kV). The Western Corridor turns south to parallel the EPNG gasline ROW for approximately 5.8 mi (9.3 km) and passes just east of the existing TEP Cyprus Sierrita Substation.

The Western Corridor continues past the Cyprus Sierrita Substation to the southwest, then turns south and enters Santa Cruz County after 6.3 mi (10 km). The Western Corridor enters the CNF 6.0 mi (9.7 km) south of the Santa Cruz County line. The Western Corridor passes south along the west side of the Tumacacori and Atascosa mountains, then meets and runs along the south side of Ruby Road as it turns gradually east, north of the Pajarita Wilderness. The Western Corridor continues south of Ruby Road then intersects the EPNG gasline ROW.

The Western Corridor continues through USFS land, paralleling the EPNG gasline ROW to the southeast for several miles to the CNF boundary. The proposed corridor exits USFS land onto private land and proceed 0.5 mi (0.8 km) east to the Gateway Substation. From the Gateway Substation, the proposed corridor returns to the west through private land and then turns south to parallel the CNF boundary. The proposed corridor meets the United States – Mexico border approximately 3,300 ft (1,006 m) west of Arizona State Highway 189 in Nogales, Arizona.

TEP will use existing utility maintenance roads and ranch access roads, where feasible,and new access ways where no access currently exists. Approximately 20 mi (32 km) of new temporary roads will be built for construction of the Western Corridor on the CNF (URS 2003a); spur roads off existing access roads adjacent to TEP transmission lines will provide project access on BLM land. On the CNF, transmission line tensioning and pulling and fiber-optic splicing sites will also disturb land.

The total new temporary area of disturbance on the CNF during construction of the Western Corridor will be approximately 197 acres (79.7 ha) (URS 2003a). Following construction, TEP will close roads not required for project maintenance and will limit access to maintenance roads, in accordance with agreements with land owners or managers (e.g., BLM or USFS). On USFS land, TEP will close existing road mileage

equal to that required for project maintenance, to avoid impacting the current road density. The maintenance access required by TEP will be limited to roads to selected structures, rather than a single cleared ROW leading to the United States – Mexico border. Transmission line tensioning and pulling sites, fiber-optic splicing sites, and construction yard areas will be obliterated within six months of the project becoming fully operational (URS 2003a).

1.3 PROJECT AREA

The project area includes the location where all construction and associated activities will occur along the ROW. Action areas are locations affected directly or indirectly by these activities and often include sites outside the immediate area of construction. Action areas are unique for each listed species and are outlined in SECTION 2.0 of this document.

Between Sahuarita and Nogales, the proposed action crosses four distinct biotic communities, or biomes (Brown 1994). A complete list of plant species documented during field surveys in 2002 is presented in Appendix B.

Figure 4. Sonoran desertscrub.

The northern end of the corridor contains vegetation characteristic of the Sonoran desertscrub biome (Figure 4). This biome is typically represented by saguaro (*Carnegiea gigantea*), cholla and prickly pear (*Opuntia* spp.) cacti, ocotillo (*Fouquieria splendens*), mesquite (*Prosopis velutina*), acacia (*Acacia* spp.) paloverde (*Parkinsonia* spp.), (*Larrea tridentata*), triangle-leaf bursage (*Ambrosia deltoidea*), and brittlebush (*Encelia farinosa*).

Vegetation south of the ASARCO mine transitions into the semidesert grassland biome (Figure 5). This area is dominated by grama (*Bouteloua* spp.), lovegrass (*Eragrostis* spp.), and three-awn (*Aristida* spp.) grasses, with low shrubs such as mesquite and acacia locally co-dominant. Agave (*Agave* spp.) and yucca (*Yucca* spp.) are also common in this biome. These grasslands are transected by desert riparian scrub dominated by mesquite and netleaf hackberry (*Celtis reticulata*).

Figure 5. Semidesert grassland.

Figure 6. Madrean oak woodland.

The higher elevations (above 3,500 ft [1,067 m])of the project area are within the madrean oak woodland biome (Figure 6). Representative plants of this biome within the project area include Mexican blue oak (*Quercus oblongifolia*) and emory oak (*Q. emoryi*) trees, side-oats grama (*B. curtipendula*), hairy grama (*B. hirsuta*), and fluffgrass (*Erioneuron pulchellum*).

The 4th biome represented within the project area is the Sonoran deciduous riparian forest (Figure 7), which is located south of Arivaca Road in Sopori Wash, Peck Canyon, and Sycamore Canyon. The high water table in these areas supports stands of cottonwood (*Populus fremontii*), ash (*Fraxinus pennsylvanica* ssp. *velutina*), sycamore (*Platanus wrightii*), walnut (*Juglans major*), and willow (*Salix* spp.) trees.

Figure 7. Sonoran deciduous riparian forest.

The proposed ROW begins at an elevation of approximately 2,674 ft (815 m) at the TEP South Substation and reaches its maximum elevation of approximately 4,500 ft (1,372 m) south of Atascosa Peak. Much of the northern portion of the proposed ROW consists of gently rolling hills and bajadas. The most significant topographical feature crossed by the proposed ROW in Pima County is Tinaja Peak (4,321 ft [1,317 m]) located southwest of the ASARCO Mine complex. The southern portion of the proposed ROW passes near the Tumacacori and Atascosa Mountains, both of which contain steep, rugged terrain. The maximum elevation within these ranges is Atascosa Peak (6,440 ft [1,963 m]).

The Tumacacori Ecosystem Management Area (EMA) contains the following Special Management Areas: Pajarita Wilderness Area, Sycamore Canyon, Goodding Research Natural Area (RNA), Chiltepine Botanical Area, and Inventoried Roadless Areas.

The Pajarita Wilderness Area (designated in 1984) encompasses 7,448 acres (3,014 ha) southwest of the Western Corridor and north of the international border. More than 660 plant species have been documented in this area, including 17 species not found anywhere else on earth. This area is valued for its nearly pristine nature and remoteness, with little disturbance resulting from human access. To maintain this landscape, motorized access in this area is prohibited; however, livestock grazing is permitted within Pajarito Wilderness outside of the Goodding RNA.

Sycamore Canyon, which runs through the Pajarita Wilderness Area, contains unique habitats of many plants and animals that are not found in the surrounding areas or are at the periphery of their natural environment. Sycamore Creek, one of the few perennial streams in southern Arizona, runs along the floor of Sycamore Canyon. A 1,759 acre (712-ha) section of Sycamore Creek and its immediate environment was nominated in 1993 as a Wild and Scenic River under the National Wild and Scenic Rivers System Act of 1968. This nomination is in recognition of the exceptional scenic, recreational, ecological, and social values supported by Sycamore Creek.

The Goodding RNA (established in July 1970) encompasses 2,207 acres (893 ha) primarily within the Pajarita Wilderness Area and along Sycamore Canyon. This special designation was placed on the area because it is characterized by Mexican floral and faunal elements that did not otherwise occur, or were elsewhere rare, in the United States.

The Chiltepine Botanical Area is a 2,836 acre (1,148 ha) reserve located approximately 2 mi (1.2 km) west of the Western Corridor, in the northern portion of the Tumacacori EMA. This area was established in June 1999 for the purpose of protecting and facilitating the study of chiltepines. These wild chiles typically are found in tropical environments between Mexico and South America. This area has been noted as the northernmost occurrence of chiltepine in the world.

Inventoried Roadless Areas have been identified within the Tumacacori EMA, encompassing 21,363 ha (52,788 acres). These areas were established by a Record of Decision on 12 January 2001 on the Roadless Area Conservation Final EIS.

1.4 CONSERVATION MEASURES

PROJECT-WIDE CONSERVATION MEASURES

1. Environmental Training - All construction supervisors will be required to attend environmental training, which will outline their obligation to obey applicable laws and regulations regarding wildlife and habitats (Appendix C).

2. Erosion Control Measures - TEP is in consultation with CNF regarding development of Best Management Practices (BMPs) for minimizing project impacts on geologic, soil, and water resources on national forest land, in accordance with the USFS "Soil and Water Conservation Practices Handbook" (USFS 1990). Specific BMPs will be identified after coordination with Arizona Department of Environmental Quality (ADEQ) and before implementation of the project, for the entire length of the selected corridor.

3. Fire Prevention Plan - A Fire Prevention Plan is under development to minimize the risk of accidental wildfire. All construction activities will adhere to this plan and fire suppression equipment will be available to all work crews. On CNF lands, the Fire Prevention Plan will comply with Forest Service Manual 5100.

4. Hazardous Material Spill Response Plan - A Hazardous Material Spill Response Plan is under development which will describe the measures and practices to prevent, control, cleanup, and report spills of fuels, lubricants, and other hazardous substances during construction operations. This plan will ensure that no hazardous materials are stored, dispensed, or transferred in streams, watercourses, or dry washes, and vehicles are regularly inspected and maintained to prevent leaks.

5. Invasive Species Control - An Invasive Species Management Plan in accordance with Executive Order 13112 is under development in coordination with CNF, ASLD, and BLM to identify problem areas and mitigation measures.

6. Road Closure/Obliteration - TEP has committed to obliterate and permanently close 1 mi (1.6 km) of existing road on the CNF (to be identified by CNF) for every 1 mi (1.6 km) of proposed new road used in the construction, operation, or long-term maintenance of the proposed action. TEP will monitor road closures during regularly scheduled inspection flights and/or ground inspections, and repair or replace road-closure structures as necessary following construction. Furthermore, TEP will cooperate with land owners on all reseeding and ongoing road closure maintenance.

   The following selective criteria and techniques for closing roads are taken from Section 1.3.2 of the RA (URS 2003) and applies to access roads on CNF. Administrative roads will be closed to the general public but made available to TEP and its assigned contractors for the evaluation, maintenance, or upgrading of existing facilities.

Closure methods for administrative roads will include the following:

a. Placement of heavy pipe posts with an attached, locked chain in a manner that blocks entrance on the road.

b. Placement of heavy pipe posts with an attached, locked gate in a manner that blocks entrance on the road.

c. Placement of a pipe barricade across the roadbed, locked in place in multiple locations in concrete sleeves.

The following methods may be used for the long-term closure of transmission line access roads used during construction and those roads required to be closed by the CNF. These roads may be reopened for emergency repair of transmission facilities, but will not be used intermittently as with administrative roads. Techniques include:

a. Placement of boulders or other natural impediments across the road.

b. Placement of a berm or trench across the road.

c. Rip, obliterate, and reseed/revegetate portions of roadbed as needed. This effort could be applied to the initial visual portion of roadway (e.g., first 100 ft [30 m]) to effectively obscure the roadway. This could be accomplished by transplanting native species of medium and large vegetation from the general area and reseeding with native grasses. By obscuring visible portions of roadway, future vehicular travel could be more effectively discouraged than by placing berms or other unnatural impediments to an otherwise visually inviting roadway.

7. Additional mitigation measures are outlined in Table 2.2-2 of the DEIS (Tetra Tech 2003).

SPECIES-SPECIFIC CONSERVATION MEASURES

Mexican spotted owl (MSO)

1. Breeding season restriction – no construction activity will occur between Structures #24 and #45 of Segment 4 from 1 March to 31 August.

2. Protocol surveys will be conducted in the year immediately before construction in Sycamore Canyon north of Ruby Road to determine the presence /absence of MSO in this area. If MSO are detected, USFWS will be consulted for further guidance.

3. No trees over 9 in (22.8 cm) diameter breast height (DBH) in MSO habitat will be removed.

Cactus ferruginous pygmy-owl (CFPO)

1. Protocol surveys – Two consecutive years of protocol surveys will be conducted before construction activities can be begin within 1,969 ft (600 m) of designated habitat. If a CFPO is detected, USFWS has determined that certain continued construction activities will not harm or harass a CFPO as defined by ESA regulations. In areas where two consecutive years of protocol surveys cannot be completed, construction will occur outside of the breeding season.

   Four zones are described (Zone I through Zone IV) that are based upon the distance of construction activity from a known nest or activity center. Certain levels of construction can occur within each zone without resulting in harm or harassment of the species. Situations that do not comply with the restrictions provided for each zone will require USFWS authorization before construction continues. Specific development restrictions that apply to each of the four zones are described in the sections below:

   Zone I: 0 to 328 ft (100 m) from the CFPO Activity Center

   1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

   2. Construction-related activities may continue on land that has been cleared of vegetation provided that they do not exceed the level and/or intensity of activity that was occurring during the period of time that the territory was established.

   3. Activities that will be more intense or cause more noise disturbance than was occurring during the period of time that the territory was established cannot proceed without authorization from USFWS and relevant land management agencies.

   Zone II: 328 ft (100 m) to 1,312 ft (400 m) from the CFPO Activity Center

   1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

   2. No restrictions on the nature or type of construction activity (excluding the clearing of vegetation) from 1 August through 31 January of the following calendar year.

   3. Construction activities during the breeding season (1 February to 31 July) cannot exceed the levels or intensity of activities that occurred at the time the territory was established.

   Zone III. 1,312 ft (400 m) to 1,969 ft (600) from the CFPO Activity Center

1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

2. No restrictions on the levels or intensity of construction activity (excluding the clearing of vegetation) at any time of the year.

Zone IV: Greater than 1,969 ft (600 m) from the CFPO Activity Center

1. No restrictions – any activity consistent with the project description provided to USFWS (as amended by the supplemental reports) is allowed. For the purposes of this consultation, USFWS assumes that all construction or construction-related activities referred to under each zone description will be limited to those described in the project description in this BA.

2. All saguaros within construction areas will be transplanted or mitigated with minimum 6.5 ft (2 m) specimens. Within riparian desertscrub and deciduous riparian areas, tree and shrub removal will be minimized to the greatest extent possible.

Southwestern willow flycatcher (SWFL)

1. Damaged deciduous riparian vegetation will be mitigated with structure plantings of willow or cottonwood at a 2:1 ratio by species.

Lesser long-nosed bat (LLNB)

1. Agave within construction areas will be transplanted or replaced with similar age and size class individuals.

Chiricahua leopard frog (CLF)

1. To prevent the spread of disease, equipment-cleaning stations will be established at sites to be determined in consultation with CNF and USFWS.

Pima pineapple cactus (PPC)

1. Purchase of credits in a USFWS-approved conservation bank for PPC at a ratio to be determined in consultation with USFWS.

Jaguar

1. Five remote cameras will be donated to the Jaguar Conservation Team to assist with monitoring of jaguar movements across the Arizona-Mexico border. These cameras will be placed within the Tumacacori EMA under permit from CNF. If female jaguar or cubs are documented by the Jaguar Management Team within the Tumacacori EMA, consultation with USFWS will be reinitiated.

2.0 FEDERALLY LISTED SPECIES

Special status species are plant and wildlife species that are of concern because their populations are either in jeopardy of extinction or are declining in number. AGFD and USFWS were contacted concerning information on possible threatened and endangered species that may exist on or near the proposed action. In a letter dated 14 May 2002, USFWS listed 18 endangered species, seven threatened species, and two proposed species that occur in Pima and Santa Cruz counties, Arizona (Table 2). Agency correspondence is presented in Appendix A. Species included in USFWS correspondence, but excluded from evaluation are addressed in Appendix D.

Meetings with USFWS and USFS personnel were held on 9 April, 13 May, 3 December 2002, and 28 March 2003 to discuss the potential effects of the proposed action on special status species. BLM personnel also attended the 3 December 2002 meeting. Additional meetings were held with USFWS on 30 May, 6 November, 10 December 2002, and 19 March 2003, and with AGFD on 19 April 2002.

Table 2. Federally listed species that may occur near the proposed action.

SPECIES	STATUS	*DRAFT* DETERMINATION
Canelo Hills ladies' tresses	Endangered	No Effect
Cactus ferruginous pygmy-owl	Endangered	May affect, likely to adversely affect
Desert pupfish	Endangered	No Effect
Gila topminnow	Endangered	May affect, not likely to adversely affect
Huachuca water umbel	Endangered	No Effect
Jaguar	Endangered	May affect, not likely to adversely affect
Jaguarundi	Endangered	No Effect
Kearney's blue star	Endangered	No Effect
Lesser long-nosed bat	Endangered	May affect, likely to adversely affect
Masked bobwhite	Endangered	No Effect
Mexican gray wolf	Endangered	May affect, not likely to adversely affect
Nichols turk's head cactus	Endangered	No Effect
Northern aplomado falcon	Endangered	No Effect
Ocelot	Endangered	No Effect
Pima pineapple cactus	Endangered	May affect, likely to adversely affect
Sonoran pronghorn	Endangered	No Effect
Sonoran tiger salamander	Endangered	No Effect
Southwestern willow flycatcher	Endangered	May affect, not likely to adversely affect
Bald eagle	Threatened	No Effect
California brown pelican	Threatened	No Effect
Chiricahua leopard frog	Threatened	May affect, likely to adversely affect
Loach minnow	Threatened	No Effect
Mexican spotted owl	Threatened	May affect, not likely to adversely affect
Sonora chub	Threatened	May affect, likely to adversely affect
Spikedace	Threatened	No Effect
Mountain plover	Proposed	No Effect
Gila chub	Proposed	No Effect

2.1 MEXICAN SPOTTED OWL (*Strix occidentalis lucida*) (Threatened)

2.1a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the MSO includes those areas of MSO habitat that may be directly impacted by construction as well as protected activity centers (PAC) within 1 mi (1.6 km) of the proposed action that may be subject to noise disturbance during construction. The entire action area for this species is within the Tumacacori EMA.

2.1b Natural History and Distribution

The MSO is one of three subspecies of spotted owl currently recognized by the American Ornithologists' Union in their most recent treatise on subspecies (A.O.U. 1957). However, Dickerman (1997), in a recent taxonomic review of *S. o. lucida*, has identified three subspecies throughout the species' range, including resurrecting the use of *S. o. huachucae* as the subspecies in the southwestern United States and northern Mexico. Although this new revision is probably valid, the currently accepted taxonomy was followed. The MSO (Figure 8) is a medium-sized owl with a round head lacking ear tufts; light brown to dark brown plumage, and dark eyes. It has white spots on the head and nape, and white mottling on the breast and abdomen; thus, the name spotted owl (Pyle 1997). All three subspecies of spotted owl inhabit mountainous, forested regions of western North America.

Figure 8. Mexican spotted owl.

A detailed account of the spotted owl, inclusive of the three currently recognized subspecies, is given by Gutiérrez et al. (1995). Ganey (1998) presents a synthesis of what is presently known about the MSO, particularly in Arizona. The MSO Recovery Plan (USFWS 1995a) and technical supporting chapters on distribution and abundance (Ward et al. 1995), population biology (White et al. 1995), landscape analysis and metapopulation structure (Keitt et al. 1995), habitat relationships (Ganey and Dick 1995), and prey ecology (Ward and Block 1995) also are important summary documents. The following brief species account was obtained from these and other more current references.

The MSO is widely but patchily distributed in forested mountains and canyons from southern Utah and central Colorado, south into Arizona, New Mexico, extreme western Texas, and into Mexico to near Mexico City (McDonald et al. 1991, Gutiérrez et al. 1995, Ward et al. 1995, Dickerman 1997). The MSO nests, roosts, forages, and disperses in a variety of habitats in Arizona from about 3,770 ft (1,236 m) to 9,600 ft (3,150 m). Nest and roost habitats include forests and woodlands that are structurally complex, unevenly aged and multistoried, with mature or old-growth stands containing trees older than 200 years with a high (>70 percent) canopy closure, including many snags and fallen logs (Ganey and Dick 1995). According to Ganey (1998), they appear to be most common in mature and old growth forests in steep canyons, but also are found in canyons that include prominent cliffs with little forested habitat. The MSO preys on small mammals,

birds, reptiles, and insects, with woodrats (*Neotoma* spp.) and white-footed mice (*Peromyscus* spp.) constituting the bulk of its diet by biomass (Ward and Block 1995, Ganey et al. 1992, Reichenbacher and Duncan 1992).

Adult MSO are considered to have a relatively high survival rate, with an estimated probability of adult survival rate of 0.8 to 0.9 from one year to the next (White et al. 1995). Juveniles on the other hand, have a much lower survival probability rate, ranging from 0.06 to 0.29 (Ganey et al. 1998, White et al. 1995). There is a great deal of spatial and temporal variation in reproductive output, but one estimate places the general reproductive rate at 1.001 fledglings per pair (White et al. 1995). Typical of *K*-selected species (Ricklefs 1990), the MSO is long-lived with low reproductive output and generally maintains population densities near carrying capacity. The high survival rate of *K*-selected species enables MSO to maintain stable populations over time despite variable recruitment rates (White et al. 1995).

In 1993, the MSO was federally listed as a threatened species by the USFWS. The listing was based primarily on historical and ongoing habitat alteration due to timber management practices, specifically the use of even-aged silviculture, the threat of these practices continuing as prescribed in National Forest Plans, and the threat of additional habitat loss from catastrophic wildfire (USFWS 1993a).

The primary administrator of lands supporting MSO in the United States is the USFS. According to the recovery plan, 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on land administered by USFS (USFWS 1995a). The majority of known MSO have been found within Region 3 of the USFS, which includes 11 National Forests in New Mexico and Arizona. USFS Regions 2 and 4, including two National Forests in Colorado and three in Utah, support fewer MSO.

2.1c Critical Habitat

Critical habitat was designated for the MSO in 1995 (USFWS 1995b). However, it was revoked by court order in 1998 for failing to complete the National Environmental Policy Act process (USFWS 1998a). USFWS (USFWS 2000a) again proposed to designate 13.5 million acres (5.6 million ha), mostly on USFS land, as critical habitat for the species in 2000. The final rule published in the Federal Register on 1 February 2001 designated approximately 4.6 million acres (1.9 million ha) in Arizona, Colorado, New Mexico, and Utah on federal land outside of the USFS system (USFWS 2001a). The reason given for not designating critical habitat on USFS land was that current Forest Plans conform to management guidelines outlined in the recovery plan, which have undergone consultation with the USFWS, whereas other federal agencies have yet to formally adopt these guidelines. On 13 January 2003, a federal judge stated that the USFWS final rule designating critical habitat for the MSO violated the ESA. Subsequent court orders have mandated the USFWS to again propose critical habitat within nine months (13 October 2003) and publish a final designation within 15 months (13 June 2004). If any part of the area designated as critical habitat could be impacted by the

proposed action, the DOE and USFWS will include that habitat in their formal Section 7 consultation.

While the proposed action does not pass through currently designated critical habitat, it does pass through areas previously proposed as critical habitat. If the newly proposed critical habitat is similar to that originally proposed in 2000, the ROW may cross areas that will eventually be designated as critical habitat. However, the areas the ROW passes through do not contain constituent elements required for MSO habitat (see SECTION 2.1e below), and no adverse modification to any such designated habitat is likely.

2.1d Current Status Statewide

In Arizona, MSO have been documented throughout much of the state except for the arid southwestern portion. The greatest concentration of owls occurs along the Mogollon Rim from the White Mountains region to the peaks near Flagstaff and Williams (Ward et al. 1995, Ganey 1998). The majority of owls are located on federal lands managed by the USFS (USFWS 1995a).

There are three Recovery Units (RU) identified in Arizona. From north to south they are the Colorado Plateau, Upper Gila Mountains, and Basin and Range-West. No current estimate of the number of MSO within its entire range is available, but between 1990 and 1993, 103 MSO sites were recorded during planned surveys and incidental observations in the Basin and Range-West RU in Arizona (USFWS 1995a).

2.1e Environmental Baseline

The proposed action occurs in the Basin and Range - West RU. Within this RU, MSO are mainly associated with steep, rocky canyons containing cliffs and stands of oak, Mexican pine, and broad-leaved riparian vegetation (Ganey and Balda 1989). Most MSO habitat in this RU occurs on the CNF.

The proposed action passes through the Tumacacori EMA of the CNF, which currently contains five PACs. The majority of the EMA crossed by the proposed action is madrean evergreen woodland; however, much of it lacks the features typically associated with MSO habitat. Range condition in areas crossed by the proposed action is moderately high with a stable or unknown trend. Native grasses dominate groundcover throughout the action area, but some non-native species, such as Lehmann's lovegrass (*Eragrostis lehmanniana*), tree of heaven (*Ailanthus altissima*), and salt cedar (*Tamarix* spp.) occur within the EMA (USFS 2002). Lehmann's lovegrass was seeded in many areas to prevent erosion (Cox et. al. 1984) but has extended in range far beyond the seeded areas (Cox and Ruyle 1986).

Livestock stocking rates for the allotments within the Tumacacori EMA range from 1,320 Animal Unit Months (AUM) in the Peña Blanca Allotment to 2,400 AUMs in the Bear Valley Allotment. Allotment Management Plans for Bear Valley and Sardinia Allotments are currently being revised.

The proposed action passes within 1 mi (1.6 km) of PAC #0502015 and #0502016, which are immediately adjacent to each other and south of Ruby Road. PAC #0502015 contains portions of USFS roads 4195 and 4196, as well as small segments of unclassified roads. Additionally, numerous roads and campgrounds, both designated and user-created, occur within 1.6 km (1 mi) of this PAC. Multiple unclassified roads created by the U.S. Border Patrol also occur throughout the area south of Ruby Road and east of the Pajarito Wilderness Area (URS 2003).

Figure 9. Area burned in Walker fire.

The Walker Fire, a human-caused fire, burned 16,369 acres (6,624 ha) along the United States-Mexico border between 12 June and 22 June 2002. The majority of PAC #0502016 and the western portion of PAC #0502015 were within the Walker Fire perimeter. Portions of the Walker fire were very hot, especially near the international border, and the upper slopes of ridges, while areas like Walker Canyon burned relatively cool (T. Newman, CNF, pers. comm., 26 November 2002). While vegetation has begun to recover in some areas, other areas are highly susceptible to erosion due to lost groundcover (Figure 9).

The following MSO survey information was provided by CNF. PAC #0502015 has been surveyed or informally monitored twice (1999 and 2001) over the past five years, with MSO pair occupancy inferred or confirmed in 1999. No response was detected in 2001. Since 1998, PAC #0502016 was only informally monitored in 2001, with no response by MSO. Additionally, CNF personnel received reports of MSO calling in Sycamore Canyon north of Ruby Road in 2001. Following similar reports, the presence of an MSO in Rock Corral Canyon could not be confirmed after informal monitoring by CNF personnel.

2.1f Effects of Proposed Action on the MSO

Direct Effects

Vehicle and Powerline Collisions

Because MSO are primarily nocturnal and likely will not be active during daylight when construction occurs, the probability of MSO collisions with construction related vehicles is extremely low. To minimize the risk of powerline collisions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested practices for raptor protection on powerlines: the state of the art in 1996" (APLIC 1996). While there is always some risk of a MSO collision with powerlines, raptors have lower rates of collision with powerlines than passerine birds (McNeil et al. 1985). This reduced collision rate may be due to visual acuity, maneuverability, and non-flocking tendencies (Nobel 1995). The risk of bird collisions with towers has been associated with birds

being attracted to red lights used for aircraft avoidance (Kerlinger 2000). The towers used in the proposed action will not contain any lighting. No guy wires will be used in the construction of the proposed action, further reducing the potential for collisions.

Electrocution

Because power structures and towers are attractive perching and nesting sites for some raptor species, significant raptor mortality from electrocution has been reported in North America (Harness and Wilson 2000). Electrocution occurs when a bird simultaneously touches two phase conductors or a conductor and a ground wire (Bevanger 1994). Most electrocutions occur on distribution lines (34-kV or less) rather than on transmission lines (69-kV or more). This occurs because clearance between wires on distribution lines are less, and distribution lines have an array of uninsulated, structure-mounted equipment (Marti 2002). To minimize the risk of raptor electrocutions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested practices for raptor protection on powerlines: the state of the art in 1996" (APLIC 1996). Furthermore, on the structures to be used in the proposed action, the distance between the powerlines is at least 18 ft (5.5 m). Because the average wingspan of an adult MSO is 3.3 ft (1 m), there is no foreseeable risk of electrocution.

Construction Noise and Activity

Human activity within breeding and nesting territories may affect some raptors by altering home range movements (Anderson et al. 1990) and causing nest abandonment (Postovit and Postovit 1987). Disturbance from construction activities may discourage MSO from foraging or nesting in suitable habitat. The greatest noise disturbance will result from the use of helicopters during installation of transmission lines; however, Delaney et al. (1999) found that MSO were disturbed more by ground-based disturbance, such as chain saws, than by helicopter overflights. Ground-based disturbance could result from heavy machinery or large groups of construction personnel working near MSO habitat.

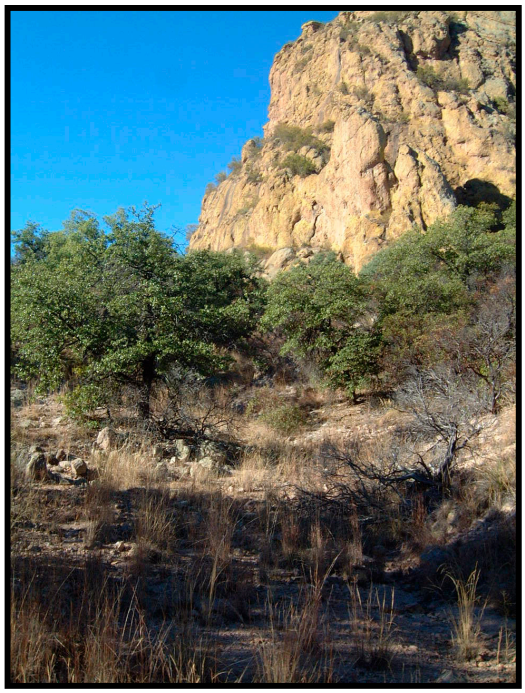

Figure 10. Location of proposed road within MSO PAC #0502015.

To prevent the disturbance of breeding MSO, no construction activities will occur within 1.6 km (1 mi) of PAC #0502015 (Figure 10) and #0502016 during the breeding season (1 March to 31 August), as outlined in the conservation measures (SECTION 1.4). Construction during non-breeding season will be short term in duration.

Furthermore, protocol surveys in the area of reported MSOs in Sycamore Canyon north of Ruby Road will prevent disturbance of MSOs outside of known PACs. If MSO are detected during the future surveys in this area, USFWS will be consulted for guidance regarding the implementation of construction restrictions.

Indirect Effects

Habitat Modification and Fragmentation

The proposed action requires the construction of 0.07 mi (0.113 km) of access roads within PAC #0502015. However, the location of this proposed road contains only manzanita (*Arctostaphylos* sp.) and small oak trees that are of insufficient size to function as MSO habitat (Figure 12). Therefore, no direct impacts to the functional composition or structure of occupied or potential MSO nesting habitat are anticipated.

Increased Legal and Unauthorized Access to MSO Habitat

Incidental encounters between MSO and non-motorized recreationists are relatively insignificant in most cases (USFWS 1995a). Most MSO appear to be relatively undisturbed by small groups (< 12 people) passing nearby (USFWS 1995a) as long as the disturbance is not for an extended period of time. The potential for hikers to disturb MSOs is greatest where hiking is concentrated in narrow canyon bottoms occupied by nesting or roosting MSOs. Noise from recreationists using off-highway vehicles (OHV) on closed access roads are much more likely to disturb MSOs, especially if their activity occurs over an extended period of time in occupied MSO habitat. Increased access to MSO habitat may subject the species to poaching or other harassment.

The road closure techniques outlined in the RA (URS 2003) should minimize unintended use of temporary construction roads but probably will not prevent it entirely. However, because only a small segment of a construction road will occur within a PAC, and forest service roads already exist within the PAC, no significant increase in unauthorized vehicular access by recreationists into occupied MSO habitat is anticipated.

Accidental Wildfire

Because of their mobility, MSO will not likely be directly impacted by wildfires. However, fire suppression efforts over the past century have created a situation that may encourage catastrophic, large-scale fires. Efforts to limit such fires are of great importance to MSO conservation. Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). The short-term effects of wildfires may affect MSO prey species through direct mortality from the fire or habitat destruction. Herbaceous plant species that serve as cover and forage for small mammals could be drastically reduced. However, because of reduced groundcover, predation upon surviving small mammals by MSO may actually increase in the short term. Furthermore, increased herbaceous production in the years following a fire may improve habitat for small mammals.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining

what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak efficacy in southern California came to similar conclusions (Green 1977).

If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of down woody material, which is capable of carrying wildfires across the landscape. Furthermore, the measures being developed for the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in MSO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.1g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Because the action area for this species lies entirely on USFS land, all activities are managed according to the MSO recovery plan guidelines, and future actions will be subject to the consultation requirements established under Section 7, and are not considered cumulative to the proposed action.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the MSO action area, an increase in population in Nogales, and other regional population centers may translate into an increased demand for outdoor recreation, and therefore more recreational use of USFS land.

An undetermined level of border crossings by undocumented immigrants (UDI) occurs within the action area, resulting in habitat damage from new roads, discarded trash,

illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.1h Effects Determination and Incidental Take

Construction noise and activities may affect non-breeding MSO but is not likely to adversely affect the species, because construction will occur during a non-critical life stage and will be short term in duration.

Because the proposed action is not likely to adversely affect the MSO, no take is anticipated.

2.2 CACTUS FERRUGINOUS PYGMY-OWL (*Glaucidium brasilianum cactorum*) (Endangered)

2.2a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the CFPO includes those areas of habitat below 4,000 ft (1,219 m) in elevation that may be directly impacted by construction as well as potential nesting sites within 1,312 ft (400 m) of the proposed action (USFWS 2000b.) that may be subject to noise disturbance during construction. In addition, a 7.08 mi (11.4 km) buffer area surrounding the project area is included in the action area because juvenile CFPO have been documented traveling up to 7.08 mi (11.4 km) during dispersal (M. Wrigley, USFWS, pers. comm., May 2001).

2.1b Natural History and Distribution:

USFWS listed CFPO in Arizona on 10 March 1997 (USFWS 1997a) as endangered. Listing was based on historical and current evidence that suggested a significant population decline of this subspecies had occurred in Arizona. USFWS considered the loss and alteration of habitat as the primary threat to the remaining population. A recovery plan for the species is currently in development by the CFPO recovery team.

CFPO (Figure 11) are small brown birds with a cream-colored belly streaked with paler brown (Pyle 1997). The *cactorum* race; however, is described as "a well-marked, pale grayish extreme for the species" (Phillips et al. 1964). The call for this mostly diurnal owl is heard chiefly near dawn and dusk. The best field identification features are its small size, eyespots on the nape of the neck, and long reddish-barred tail, which is often nervously wagged or twitched (Monson 1998).

Figure 11. Cactus ferruginous pygmy-owl.

Originally CFPO were described as a separate subspecies based on specimens from Arizona and Sonora, Mexico. CFPO were first documented in the United States from a collection by Lieutenant Charles E. Bendire on 24 January 1872 in the "heavy mesquite thickets along creek" near the present day site of historic Camp Lowell, Tucson (Coues 1872, Bendire 1892).

Very little is known about the life history of CFPO in Arizona (Cartron et al. 2000a). Little or no literature currently exists concerning life history variables such as longevity, age distribution, and recruitment. Current studies undertaken by AGFD, USFWS, and The University of Arizona are examining these variables.

The diet of CFPO is not well understood, but they are believed to be prey generalists (Cartron et al. 2000a). Observations, stomach content analysis, and records of Texas

pygmy-owls suggest that these owls have a diverse diet that includes mammals, birds, reptiles, and insects (Proudfoot and Beasom 1997).

CFPO nest in cavities of larger trees (typically defined as a tree with a trunk at least 6 in [15 cm] diameter at breast height [DBH]) or large columnar cactus. Cavities may be naturally formed (e.g. knotholes) or excavated by woodpeckers. CFPO do not construct their own nest holes. All currently known CFPO nest sites in Arizona are in woodpecker excavated cavities in saguaros. Historically, the species also has been documented nesting in cottonwood, paloverde, and mesquite trees in Arizona.

Nesting activity for this owl species in Arizona begins in late winter to early spring (Lesh and Corman 1995, Abbate et al. 1996). Little is known about its courtship flight behavior. Egg laying begins by late April with three to four eggs typically laid. It is uncertain if only one brood is hatched per year. Nestlings have been observed through the end of July. During nesting, the male brings food to the female and young (Glinski 1998).

Historically, CFPO occurred from the lowlands of central Arizona, south through western Mexico to the states of Colima and Michoacan, and from southern Texas south through the Mexican states of Tamaulipas and Nuevo Leon. In Arizona, the species was documented as far north as New River and Cave Creek in northern Maricopa County (Harris and Duncan 1999). Elsewhere in Maricopa County, the species has been found near the Yuma County line along the Gila River at Agua Caliente, along the Salt River at Phoenix, and near the Verde River confluence. The eastern most verifiable record was along the Gila River at Old Fort Goodwin, located approximately 2 mi (1.2 km) southwest of present day Geronimo, Graham County, Arizona (Aiken 1937). In the southeastern part of the state, the species has been documented in recent times near Dudleyville along the lower San Pedro River between 1985 and 1987 (Harris and Duncan 1999), and probably also along lower Aravaipa Creek in 1987 (Monson 1987). Other localities in south central Arizona include historical records in Pinal County near Sacaton and Blackwater on the Gila River Indian Reservation, and at Casa Grande (Harris and Duncan 1999). Near the Mexican border, the species has been found in Santa Cruz County near Patagonia and in Sycamore Canyon west of Nogales. A likely accidental sighting was documented once on 10 April 1955 in eastern Yuma County near the Mexican border at Cabeza Prieta Tanks on the Cabeza Prieta National Wildlife Refuge (Monson and Phillips 1981, Harris and Duncan 1998).

Surveys conducted by University of Arizona biologists in Sonora, Mexico found 280 CFPO during the 2000 survey season. CFPO within Sonora, Mexico and Arizona may have been the same population prior to agricultural expansion within the last 75 years. However, due to isolation, the genetic connection of the Arizona population to owls in the nearby state of Sonora, Mexico may be tenuous (USFWS 2002a).

CFPO have been documented in several habitat types in the northern portion of its range in Arizona and adjacent Mexico. In Arizona, these include streamside Sonoran riparian deciduous forest and woodland associations and Sonoran desertscrub. CFPO also inhabit

Sinaloan deciduous forest and thornscrub in Mexico (not discussed here). The streamside associations include such species as cottonwood, ash, netleaf hackberry, willows, velvet mesquite, and others. The Sonoran desertscrub associations are composed of relatively dense saguaro cactus stands associated with short trees such as paloverde, mesquite, and ironwood (*Olneya tesota*), and an open understory of triangle-leaf bursage, creosote, and various other cacti and shrubs. Throughout its range, CFPO occur at low elevations, generally below 4,000 ft (1,219 m).

CFPO found in Sonoran desertscrub habitats are typically associated with structurally diverse stands of desert riparian scrub with saguaros along washes (Wilcox et al. 2000). Such habitat is often referred to as xeroriparian vegetation (Johnson and Haight 1985). These washes have no permanent water flow. Instead, flow is intermittent and based on seasonal rainfall as well as strength and duration of individual storms. Desert riparian scrub vegetation is easily recognizable by the presence of a linear assemblage of trees and shrubs that grow along the wash. Density is higher and taller than the sparse desertscrub vegetation that typically exists in the adjacent uplands. Before listing the species as endangered, all known CFPO were documented in such Sonoran desertscrub habitat (Lesh and Corman 1995, Abbate et al. 1996).

At the northern periphery of the subspecies range in southern Arizona, CFPO distribution and preferred habitat is not well understood. It is believed CFPO require the cover of denser wooded areas with understory thickets, like riparian habitat, for nesting, foraging, and predator avoidance (Abbate et al. 2000). Riparian habitat also is known for its high density and diversity of animal species that constitute the prey base of CFPO.

A significant decline in the Arizona population has occurred over the past several decades (USFWS 1997a, Richardson et al. 2000). Loss or modification of habitat from woodcutting, agriculture, groundwater pumping, and related human activities has presumably contributed to the population decline (USFWS 1997a).

2.1c Critical Habitat

On 12 July 1999, USFWS designated approximately 731,712 ac (296,113 ha) of critical habitat supporting riverine, riparian, and upland vegetation in seven critical habitat units, located in Pima, Cochise, Pinal, and Maricopa counties of Arizona (USFWS 1999). However, on 21 September 2001, the U.S. District Court for the State of Arizona vacated this final rule designating critical habitat for CFPO, and remanded its designation back to the USFWS for further consideration. On 27 November 2002, USFWS proposed designating 1.2 million ac (485,000 ha) of critical habitat for CFPO in southern Arizona (Federal Register Vol. 67, No 229:71031-71064). The proposed action does not enter any areas proposed as critical habitat.

2.1d Current Status Statewide

USFWS determined that CFPO in Arizona were endangered because of the following factors (USFWS 1997a):

- present or threatened destruction, modification, or curtailment of its habitat or range;
- inadequacy of existing regulatory mechanisms;
- other natural and manmade factors, which include low genetic viability.

Surveys conducted statewide during the 2002 season confirmed a total of 18 adult CFPO and three nests in Arizona. Similar to the previous four years, there was greater than 50 percent fledgling mortality documented in 2002, with only one juvenile confirmed surviving dispersal (S. Richardson, USFWS, pers. comm., 3 December 2002).

One of most urgent threats to CFPO in Arizona is thought to be the loss and fragmentation of habitat (USFWS 1997a, Abbate et al. 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments directly and indirectly impacts CFPO survival and recovery (Abbate et al. 1999). In recent decades, CFPO riparian habitat has continually been modified and destroyed by agricultural development, woodcutting, urban expansion, and general watershed degradation (Phillips et al. 1964, Brown et al. 1977, State of Arizona 1990, Bahre 1991, Stromberg et al. 1992, Stromberg 1993a and 1993b). Sonoran desertscrub has been affected to varying degrees by urban and agricultural development, woodcutting, and livestock grazing (Bahre 1991). Pumping of groundwater and the diversion and channelization of natural watercourses are also likely to have reduced CFPO habitat.

Proudfoot and Slack (2001) found that CFPO in northwestern Tucson may be isolated from other populations in Arizona and Mexico. Low genetic variability can lead to a reduction in reproductive success and environmental adaptability. In 1998 and 1999, two cases of sibling CFPO pairing and breeding were documented (Abbate et al. 1999). In both cases, young were fledged from the nesting attempts. These unusual pairings may have resulted from extremely low numbers of available mates within dispersal range, and/or from barriers (including fragmentation of habitat) that have influenced dispersal and limited the movement of young owls (Abbate et al. 1999).

Soule (1986) notes that very small populations are in extreme jeopardy due to their susceptibility to a variety of factors, including variations in birth and death rates that can result in extinction. In small populations such as with CFPO, each individual is important for its contribution to the genetic variability of that population.

2.1e Environmental Baseline

CFPO habitat north of Sahuarita Road consists of Sonoran desertscrub with relatively high species diversity and structural diversity, including scattered saguaro cacti containing potential nesting cavities. This area is within Survey Zone 1 (USFWS 2000) and has the highest potential for occupancy of the entire action area. Land status in this area is a mixture of private and state land. The Mission Mine Complex also is located within this section of the proposed action and grazing occurs on much of the state lands in the area.

CFPO habitat south of Sahuarita Road consists primarily of semi-desert grassland dominated by mesquite and acacia trees, mixed-cacti, ocotillo, yucca, and grasses, including non-native Lehmann's lovegrass (*Eragrostis lehmanniana*). The area is primarily undeveloped, but does contain some existing electrical distribution lines and associated roads (Figure 12) as well as low density housing developments. These grasslands are transected by desert riparian scrub dominated by mesquite and netleaf hackberry trees. Some areas of deciduous riparian forests are also found south of Arivaca Road in Sopori Wash and Peck Canyon. Land jurisdictions in this area include private, state, BLM, and USFS.

Figure 12. Example of existing disturbance within corridor.

CFPO surveys were conducted by Harris Environmental Group, Inc. (HEG) biologists in 2001 and 2002 (data previously submitted to USFWS) in accordance with the approved protocol (USFWS 2000b). Surveys were conducted in Sonoran desertscrub habitat where saguaros were present and in desert riparian scrub and deciduous riparian habitat that contained large trees (over 15.2 cm [6 in] DBH). No surveys have been conducted in deciduous riparian habitat within Sopori Wash. Surveys were conducted at 142 call points in 2001 and 140 call points in 2002. No CFPOs were detected during either survey year.

The only historical records of CFPO within the Nogales Ranger District (RD) of the CNF are in Sycamore Canyon (CNF 2000) and a dispersing juvenile in the Jarillas Allotment. USFS surveys in Sycamore Canyon in 1997 and 1998 did not locate CFPO. Additionally, USFS personnel surveyed 2,300 ac (930 ha) in 1999 with negative results and conducted 58 habitat assessments for CFPO habitat (CNF 2000). The habitat assessments identified four areas that ranked high enough to warrant CFPO surveys. No CFPO have been detected during surveys of these four areas (T. Newman, CNF, pers. comm., 9 October 2002).

2.1f Effects of Proposed Action on the CFPO

Direct Effects

Vehicle and Powerline Collisions

CFPO collisions with windows and fences have been documented in the Tucson area (USFWS 2002a), and observations of low flying CFPO across roadways indicate vehicle collisions are a realistic hazard (Abbate et al. 1999). While CFPO may be active during daylight, no CFPO have been detected within the action area, therefore, CFPO collisions with construction related vehicles are unlikely.

There is a small risk of a CFPO collision with power lines, however, raptors have lower rates of collision with power lines than passerine birds (McNeil et al. 1985). This reduced collision rate may be due to visual acuity, maneuverability, and non-flocking tendencies (Nobel 1995). To minimize the risk of powerline collisions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC 1996).

Electrocution

Because power structures and towers are attractive perching and nesting sites for some raptor species, significant raptor mortality from electrocution has been reported in North America (Harness and Wilson 2000). Electrocution occurs when a bird simultaneously touches two phase conductors or a conductor and a ground wire (Bevanger 1994). Most electrocutions occur on distribution lines (34-kV or less) rather than on transmission lines (69-kV or more), primarily because clearances between wires on distribution lines are less and distribution lines have an array of uninsulated, structure-mounted equipment (Marti 2002). To minimize the risk of raptor electrocutions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC 1996). Furthermore, on the structures to be used in the proposed action, the distance between the power lines is at least 18 ft (5.5 m). Because the average wingspan of an adult CFPO is 15 in (38 cm), there is no foreseeable risk of electrocution.

Construction Noise and Activity

Although no CFPO have been detected in the project area, short term noise disturbance and human activity associated with construction may discourage CFPO from using habitat within and adjacent to the proposed ROW. Human activity near nest sites at critical periods of the nesting cycle may cause CFPO to abandon their nests (USFWS 2002a). While CFPO may tolerate low level noise disturbances, such as those in low density residential areas (Cartron et al. 2000b), they will probably not tolerate noise levels associated with construction activities in close proximity to a nest. The greatest likelihood of noise disturbance will result from the use of helicopters during the installation of the transmission lines, but also could result from the presence of heavy machinery or large groups of construction personnel. If CFPO are not detected during the two consecutive years of protocol surveys, the potential for direct impacts to this species is minimal.

Indirect Effects

Habitat Modification and Fragmentation

The proposed action will result in the disturbance of areas that could provide potential nesting, foraging, and dispersal habitat for CFPO. Because many access roads will be closed and restored and all disturbed areas will be reseeded, this disturbance will be temporary. The proposed action could potentially result in temporary disturbance to habitat from access roads and structure installations in the following amounts: 34 acres (13.76 ha) in Sonoran desertscrub, 41.27 acres (16.70 ha) in desert riparian scrub, and 0.05 acres (0.02 ha) in deciduous riparian.

While all large saguaros within construction sites will be transplanted, construction could temporarily degrade CFPO habitat by removing vegetation that provides forage and shelter. Elimination of groundcover plant species, rodent burrows, and native soils, as well as loss of trees and shrubs, may impact local reptile and bird populations that are important to the pygmy-owl diet. Loss of complex vegetation structure increases energy demands on owls that must forage at greater distances and risk exposure to a variety of hazards (Abbate et al. 1999). Because of the linear nature of the proposed action, these impacts will be widely distributed and relatively minor in any single area.

Increased Legal and Unauthorized Access to CFPO Habitat
Although CFPO have not been detected in the project area, recreationists may access potential CFPO habitat using temporary construction roads associated with the proposed action. While hikers and other non-motorized recreationists will create minimal disturbance, noise from Off Highway Vehicle (OHV) users are much more likely to disturb CFPO, especially if the activity occurs over an extended period of time in or near a CFPO nesting territory. Increased access to CFPO habitat may subject the species to poaching or other harassment. While TEP will prevent unauthorized access to the ROW across private land, closure of the ROW on public land, particularly state land, is not feasible. Therefore, some increase in access to potential CFPO habitat is anticipated.

Accidental Wildfire
Increased road access may contribute to an increase in the frequency of human caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, CFPO will not likely be directly impacted by wildfires. However, wildfires may destroy columnar cacti and trees that provide nesting cavities as well as affect CFPO prey species through direct mortality from the fire or habitat destruction. Herbaceous plant species that serve as cover and forage for small mammals could be drastically reduced. Because of reduced groundcover, predation upon surviving small mammals by CFPO may actually increase in the short term. Furthermore, increased herbaceous production in the years following a fire may improve habitat for small mammals in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977).

The measures outlined in the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and

Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.1g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species crosses private, state, and federal lands, the habitat with the highest potential for occupancy by CFPO occurs on state and private lands in Pima County. Future federal actions on these lands will be subject to Section 7 consultation. These actions will not be considered cumulative.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). Because of the growth rate and the development pressures from nearby Tucson and Sahuarita, it is foreseeable that land adjacent to the proposed ROW will be developed. These developments will likely include increases in associated infrastructure such as roads, groundwater use, and commercial services, all resulting in the degradation of CFPO habitat.

An undetermined level of border crossings by undocumented immigrants occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase. Additionally, agriculture, recreation, OHV use, grazing, and other activities continue to occur on private and state land and adversely affect CFPO and their habitats.

2.1h Effects Determination and Incidental Take

While CFPO are not currently known to occupy the action area, the disturbance of potential habitat from construction activities and increased access may affect, and are likely to adversely affect, this species.

Take of CFPO is not anticipated because construction activities during breeding season will only occur following protocol surveys and the Conservation Measures outlined in SECTION 1.4 will minimize disturbance to potential habitat and prevent disturbance to nesting CFPO within the action area should any be detected in the future.

2.2 SOUTHWESTERN WILLOW FLYCATCHER (*Empidonax traillii extimus*) (Endangered)

2.2a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential migratory habitat for the SWFL includes those areas of Sopori Wash with riparian habitat similar to that described by Sogge et al. (1997). The action area for this species consists of the Sopori Wash both within the proposed ROW as well as the surrounding Sopori Wash watershed.

2.2b Natural History and Distribution

SWFL (Figure 13) are small passerine bird (Order Passeriformes; Family Tyrannidae) measuring approximately 5.75 in (14.6 cm) in length from the tip of the bill to the tip of the tail and weighing 0.4 ounces (11.34 grams). This species has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark and the lower is light yellow grading to black at the tip. SWFL are riparian obligate species, nesting along rivers, streams, and other wetlands where dense growths of willow, seepwillow (*Baccharis* sp.), buttonbush (*Cephalanthus* sp.), boxelder (*Acer negundo*), saltcedar (*Tamarix chinensis*), carrizo (*Phragmites australis*) or other plants are present, often with a scattered overstory of cottonwood and/or willow.

Figure 13. Southwestern willow flycatcher.

One of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993), SWFL are neotropical migratory species that breed in the southwestern U.S. from approximately 15 May to 1 September. This species migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical range of SWFL included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

SWFL breed in dense riparian habitats from sea level in California to just over 7,000 ft (2,134 m) in Arizona and southwestern Colorado. Historic egg/nest collections and species descriptions throughout SWFL range describe the widespread use of willow for nesting (Phillips 1948, Phillips et al. 1964, Hubbard 1987, Unitt 1987, San Diego Natural History Museum 1995). Currently, SWFL primarily use Geyer willow (*Salix geyeriana*), Goodding willow (*Salix gooddingii*), boxelder, saltcedar, Russian olive (*Elaeagnus angustifolio*), and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush, black twinberry (*Lonicera involucrata*), cottonwood, white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), carrizo, and stinging nettle (*Urtica* spp.). Nesting SWFL exhibit a strong preference for dense

vegetation at the nest site, but high variation and density of vegetation at the patch scale (Hatten et al. 2000). Nesting sites are typically close to the edge of the vegetation patch and close to water (Allison et al. 2000). Based on the diversity of plant species composition and complexity of habitat structure, four basic nesting habitat types can be described for SWFL: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al.1997).

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of SWFL territories and nests; SWFL sometimes nest in areas where nesting substrates are in standing water (Maynard 1995, Sferra et al. 1995, 1997). Hydrological conditions at a particular site can vary remarkably in the arid southwest within a season and between years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer et al. 1996). Throughout their range, SWFL arrive on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge et al. 1993, Sogge and Tibbitts 1994, Muiznieks et al. 1994, Maynard 1995, Sferra et al. 1995, 1997). Nesting begins in late May and early June, and young fledge from late June typically through mid August, but as late as early September.

SWFL are insectivores, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. Flying insects are the most important SWFL prey item; however, they will also glean larvae of non-flying insects from vegetation (Drost et al. 1998). Drost et al. (1998) found that the major prey items of SWFL (in Arizona and Colorado), consisted of true flies (Diptera); ants, bees, and wasps (Hymenoptera), and true bugs (Hemiptera). Other insect prey taxa include leafhoppers (Homoptera: Cicadellidae), dragonflies and damselflies (Odonata); and caterpillars (Lepidoptera larvae). Non-insect prey include spiders (Araneae), sowbugs (Isopoda), and fragments of plant material.

2.2c Critical Habitat

Critical habitat for SWFL was originally designated on 22 July 1997 (USFWS 1997b), but on 11 May 2001, the 10th Circuit Court of Appeals set aside the critical habitat designation and instructed USFWS to issue a new designation in compliance with the court ruling. USFWS is currently soliciting information regarding areas important for the conservation of this species in order to re-propose critical habitat.

2.2d Current Status Statewide

The following status of SWFL in Arizona was summarized from Smith et al. (2002). In 2001, 177 sites covering approximately 139 mi (225 km) of riparian habitat were surveyed for SWFL in Arizona. Sites range from 98 ft (30 m) to 8,802 ft (2,683 m) in elevation and 98.5 ft (30 m) to 10 mi (16.1 km) in length. The mean site length was 1 mi (1.6 km). Fifty-two of the 177 sites were not surveyed according to protocol. This was due to time or funding limitations or because unsuitable SWFL habitat was found during the first survey. Of the 177 sites, 20 had not been previously surveyed. Most new survey

sites were located along the Colorado River (n = 9) and Gila River (n = 4). Six hundred thirty-five resident SWFL were documented within 346 territories at 46 sites. AGFD personnel and statewide cooperators recorded 311 pairs.

SWFL were documented along 11 drainages. The greatest concentrations of SWFL were found at Roosevelt Lake (40 percent) and the Winkelman Study Area (35 percent). Resident SWFL were detected at five sites that had been surveyed at least once in previous years. Resident SWFL were documented in two drainages (Virgin River and Cienega Creek) for the first time since protocol surveys began. No historical occurrence record exists for SWFL along the Virgin River and SWFL have not been reported at Cienega Creek since 1964. These colonizations yield evidence of habitat restoration potential in these drainages that can aid in recovery of the SWFL.

2.2e Environmental Baseline

The section of Sopori Wash crossed by the proposed action supports a mixed riparian assemblage with mature but discontinuous Fremont cottonwood and netleaf hackberry along the banks and a midstory of large mesquite (HEG Field Notes, C. Hisler, AGFD, pers. comm., 18 July 2002) (Figure 14). Understory density is relatively low. Uplands surrounding Sopori Wash are characterized by semidesert grassland and are subject to grazing.

Figure 14. Riparian habitat in Sopori Wash

This reach of Sopori Wash is ephemeral, and water is probably present only for short periods of time following precipitation events. Because of the patchy habitat and lack of

surface water, this area will likely be used only by migratory SWFL. The nearest recent (1999) reports of SWFL are from the Santa Cruz River between Tubac and Rio Rico, approximately 6 mi (10 km) to 12 mi (20 km) away (McCarthey et al. 1998, Paradzick et al. 1999, Paradzick et al. 2000). All of these reports were of migrant SWFL.

2.2f Effects of Proposed Action on the SWFL

Direct Effects

Because the proposed action does not impact suitable breeding habitat, no direct impacts to SWFL are anticipated.

Indirect Effects

Habitat Modification and Fragmentation

Some indirect impacts to SWFL may result from modifications to potential migratory habitat associated with the installation of structures within the Sopori Wash floodplain. Roads in this area will be limited to a width of 12 ft (4 m), resulting in the disturbance of 0.14 acres (0.06 ha) of deciduous riparian habitat. Because disturbed cottonwood and willow specimens will be mitigated at a 2:1 ratio, and riparian vegetation can recover quickly following minimal disturbance, any adverse effects to SWFL habitat will be temporary.

Increased Legal and Unauthorized Access to SWFL Habitat

Because this section of Sopori Wash is on a private ranch, unauthorized recreational access to this section of Sopori Wash via the temporary construction roads associated with the proposed action should not occur. Therefore, no disturbance of SWFL or habitat modification from increased access is anticipated.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). However, because new roads in this area will not be open to the public, increased risk of wildfire because of increased access will be negligible. The measures outlined in the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the

fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.3g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Most land within the action area consists primarily of ASLD land with blocks of private parcels on either side of Arivaca Road. Federal actions will, on these lands, be subject to Section 7 consultation; these actions will not be considered cumulative.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Pima County grew by 26.5 percent and Santa Cruz County by 29.3 percent (U.S. Census Bureau 2000). Because of these growth rates and the trend of rural development to occur in areas with some existing infrastructure, it is foreseeable that the private ranches adjacent to Arivaca Road could be sold and subdivided for residential homes and ranchettes. Any substantial population increase in the area also could increase demands for access to recreational lands, increase groundwater pumping, and foster development of commercial services. These impacts to the watershed could degrade the value of habitat within Sopori Wash, thereby preventing its use by SWFL.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.3h Effects Determination and Incidental Take

The disturbance of potential migratory habitat may affect the SWFL, but it is not likely to adversely affect the species, because the disturbance is temporary and relatively small in area.

Because the proposed action is not likely to adversely affect the species, no take of SWFL is anticipated.

2.4 LESSER LONG-NOSED BAT (*Leptonycteris curasoae yerbabuenae*) (Endangered)

2.4a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential roosting habitat occurs in the Tumacacori and Atascosa/Pajarito mountains, and foraging habitat occurs through those portions of the proposed ROW that contain agave and saguaro cacti. Because LLNB have been documented foraging up to 40 mi (64 km) from roost sites, the action area for the LLNB consists of all potential foraging and roosting habitat within a 40 mi (64 km) buffer surrounding the proposed action.

2.4b Natural History and Distribution

The LLNB (formerly Sanborn's long-nosed bat) is one of three members of American leaf-nosed bats (Family Phyllostomidae) in Arizona (Hoffmeister 1986). The LLNB (Figure 15) is one of the larger Arizona bats, and gray to reddish-brown in color. This bat has an erect triangular flap of skin (nose leaf) at the end of a long slender nose. The LLNB can be distinguished from *Macrotus* by its much longer nose, greatly reduced tail membrane, and smaller ears; and from *Choeronycteris,* which has a shorter tail, larger tail membrane, and longer, narrower nose.

Figure 15. Lesser long-nosed bat.

LLNB occur from the southern United States to northern South America, including several islands and the adjacent mainland of Venezuela and Colombia. LLNB occurs between 4 degrees to 32 degrees N latitude, typically in semiarid to arid regions (Nowak 1994). This bat is typically associated with their primary food source, flower nectar and fruit of columnar cacti and certain agave species. Because of the seasonal nature of the food source, LLNB migrate to follow flowering and fruiting plants. In addition to food availability, there must be suitable roosting within commuting distance of the food source. Currently, the longest known commute distance is about 30 mi (48 km).

The primary range of this bat lies in Mexico and Central America. Occurrences in Arizona probably represent range expansion. Prior to the 1930s, there are no records of LLNB in Arizona (Cockrum 1991). Colossal Cave and the Old Mammon Mine are the most northern sites known to house colonies of these bats. However, these sites support colonies of about 5,000 individuals, versus sites in Mexico, which are as large as 150,000 individuals.

LLNB have a bi-seasonal occurrence in Arizona. The maternity season, when bats migrate to southwestern Arizona, represents a United States population of about 30,000

individuals. The fall agave flowering season, located in southeastern Arizona, which attracts about 70,000 bats. Each of these areas contains three known primary roosts and some number of secondary/transient or night roosts (sheltering tens to a few hundred individuals/site).

With the exception of a small bachelor roost located in the Chiricahua Mountains, all remaining records represent very small numbers (usually single individuals) at hummingbird feeders, caught in mist nets, or chance findings in residential areas. Constantine (1966) reported two immature females from Maricopa County, one in Phoenix on 30 August 1963 and the other in Glendale on 16 September 1963. The Glendale specimen was found dead. The other was hanging on a screen door (not a normal place) indicating something was likely wrong with that bat. He also reported two males from southern California: one was taken alive on 3 October 1993 outside a home in Yucaipa, the other was taken on 18 October 1996 from the outside of a building in Oceanside (Constantine 1998). LLNB also have been reported from the Aravaipa Canyon area (Cockrum 1991). Hoffmeister (1986) has a record in the Santa Catalina Mountains, but Cockrum (1991) states it was probably a transcription error because the nectar-feeding bats found there belong to the genus *Choeronycteris*. However, Cockrum (1991) does report LLNB from the Santa Catalina Mountains but only once in a mist net set in Sabino Canyon (a female in June).

The diet of LLNB in Arizona consists primarily of the nectar, pollen, and ripe fruit of columnar cacti (particularly saguaro) and agave (e.g., *Agave chrysantha, A. deserti, A. palmeri,* and *A. parryi*). The LLNB has been demonstrated to be a significant pollinator of saguaros, organpipe cacti (*Stenocereus thurberi*), and agaves (Howell and Roth 1981, Alcorn et al. 1962, and McGregor et al. 1962). Generally, LLNB in Arizona forage after dusk to nearly dawn during the months of May through September. In a single night, LLNB will forage well away from daytime roost sites. In Sonora, Mexico, bats feed on the mainland by night at Bahia Kino and roost by day on Isla Tiburon, 15 mi (24 km) to 20 mi (32 km) away. The closest sizable densities of columnar cacti to LLNB roosts in the Sierra Pinacate, Sonora, Mexico, are found in Organpipe Cactus National Monument in Arizona, about 25 mi (40 km) to 30 mi (48 km) away (Fleming 1991).

In Arizona, females arrive in late March and early April, then migrate northward through Mexico along a "nectar corridor" provided by columnar cacti such as saguaro and organpipe (Fleming 1991). Female LLNB usually arrive in Arizona pregnant and congregate in traditional maternity roosts at lower elevations, feeding primarily on saguaro nectar (Cockrum 1991). Later in the summer the adult males arrive and along with dispersing members of the maternity roosts, roost at higher elevations, especially within proximity to significant stands of flowering agave.

LLNB are gregarious and form large maternity colonies that number in the thousands (Hayward and Cockrum 1971, Hoffmeister 1986). All four of the verified maternity roosts of LLNB in the United States are found in Arizona (Cockrum 1991). The largest and most important of the four is found in a mine located in Organpipe Cactus National

Monument. About 15,000 LLNB use this mine as a maternity roost. Young are typically born between mid-May and early June (Cockrum 1991, Hayward and Cockrum 1971).

While in the roost during the day, LLNB engage in various activities such as flying, suckling of young, grooming, resting, and interacting with neighbors. LLNB are particularly active during the day and any disturbance, such as aircraft fly-overs or other human activities, may cause an expenditure of extra energy (Dalton and Dalton 1993, Dalton et al. 1994). Female LLNB gathered in large maternity colonies are particularly vulnerable to disturbances. Maternity colonies are more sensitive because of the vulnerability of nonvolant young, whose recruitment into the population is essential to maintain a viable population.

2.4c Critical Habitat

No critical habitat has been designated for this species.

2.4d Current Status Statewide

USFWS listed this species as endangered throughout its range in the southwestern United States and Mexico on 30 September 1988 (USFWS 1988). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. All available information on the species through 1994 was summarized in the Lesser Long-nosed Bat Recovery Plan approved in 1997 (Fleming 1994). The Plan indicates that the species is not in danger of extinction in Arizona or Mexico. The species still warrants some protection, as it is vulnerable to human disturbance at roost sites. There also is particular concern for the protection of forage plants from disturbance or destruction, particularly near roost sites.

Primary threats to LLNB populations are agave harvesting and human disturbance of roosting and maternity colonies. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the LLNB (Fleming 1995). The USFWS determined that the LLNB was endangered because of the following factors (USFWS 1988):

- A long-term decline in population
- Reports of absence from previously occupied sites
- Decline in the pollination of certain agaves

In Arizona and Mexico, there are 16 large known roosts (Fleming 1995). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. Disturbance of these roosts or removal of the food plants associated with them could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

2.4e Environmental Baseline

No LLNB roosts are known from the proposed corridor, but field surveys did locate small caves and crevices nearby that could serve as LLNB day roosts (HEG 2002, unpublished data). Furthermore, unsurveyed caves, mineshafts, and adits, which may provide suitable roost sites, occur within the Tumacacori-Atascosa mountains. The two closest known LLNB roost sites are the Cave of the Bells in the Santa Rita Mountains, approximately 20 mi (32 km) to the west, and a cave in the Patagonia Mountains, approximately 35 mi (56 km) to the west. Both of these roost sites are within the known flight distance to the proposed action and LLNB may utilize the proposed corridor for foraging.

Saguaro cacti occur within proposed corridor north of Duval Mine Road, and agaves are present in varying densities south of Arivaca Road. While the exact densities of agaves and saguaro cacti were not determined for this BA, CNF estimates that Palmer's agave is widely scattered over 1 million acres (400,000 ha) at densities of 10 to 200 per acre, generally between the elevations of 3,000 ft (914 m) and 6,000 ft (1,829 m) (USFWS 2002b). Parry's agave is found between 5,000 ft (1,524 m) and 8,200 ft (2,500 m) and begins blooming in mid-spring.

The northern portion of the proposed action is primarily undeveloped but contains some existing electrical distribution lines as well as low-density housing developments near Sahuarita Road. The Mission Mine Complex also is located within this section of the project area. The proposed action passes through the Tumacacori EMA of the CNF. Range condition in areas crossed by the proposed action is moderately high with a stable or unknown trend. While agaves have persisted in areas grazed for more that 100 years, mortality through direct herbivory and trampling is known to occur. There is a forest-wide study to determine the effects of livestock grazing on agaves currently underway (USFWS 2001b). Livestock stocking rates for the allotments within the Tumacacori EMA range from 1,320 AUMs in the Peña Blanca Allotment to 2,400 AUMs in the Bear Valley Allotment. Allotment Management Plans for Bear Valley and Sardinia Allotments are currently being revised.

2.4f Effects of Proposed Action on the LLNB

Direct Effects

Construction Noise and Activity

Although no LLNB roosts have been detected within the proposed corridor, short-term noise disturbance and human activity associated with construction activities may disturb LLNB if they are present in undetected roosts adjacent to the proposed corridor. The greatest likelihood of noise disturbance will result from the use of helicopters during the installation of the transmission lines, but could also result from the presence of heavy machinery or large groups of construction personnel in close proximity to an undetected roost. The consequences of disturbance to small numbers of LLNB in day roost will be less serious than disturbance of large aggregations of bats at one location.

Indirect Effects

Habitat Modification

Indirect effects to LLNB may result from the potential reduction in forage resources (agave and saguaro) during construction of temporary access roads or the installation of transmission structures. Because agave and saguaro are unevenly distributed and the nectar they provide is seasonally and geographically separated, the loss of significant numbers of either species may alter LLNB foraging patterns and roost selection within the action area. Even if the loss of a high-density patch of flowering agaves does not cause the abandonment of a roost, bat survivorship may be reduced through increased foraging flight distances and related energy expenditures, and increased exposure to predators. Because of the linear nature of the proposed action, however, these impacts will be widely distributed and relatively minor in any single area.

Although all agave and saguaro cacti disturbed as a result of the proposed action will be transplanted immediately outside of the construction zone, the long-term survival and future flowering of these specimens is uncertain. Agaves are typically easy to cultivate in warm climates with well-drained soils (Gentry 1982), but no long-term studies of agave transplant survival have been conducted. Transplantation of saguaro cacti is a common practice within Pima County, but preliminary results from a 10-year study of saguaro indicate that smaller saguaros (< 16 ft [5 m] tall) are more successfully transplanted than larger saguaros (HEG, unpublished data). It may take several years for saguaro cacti to die from a mortal injury, and so it is necessary to monitor transplants for many years in order to evaluate success.

Even in areas where no agaves or saguaro cacti presently exist, dormant seeds may be present in the soil. Construction activities associated with the proposed action may compact soil and alter water infiltration, which may prohibit seeds germination.

Increased Legal and Unauthorized Access to LLNB Habitat

Because LLNB are sensitive to human disturbance (to the point of temporarily abandoning a day roost after a single human intrusion) increased human access to roost sites could negatively impact LLNB. New roads on state land will not likely result in disturbance to undetected roosts because few areas in this area the support rock outcroppings, caves, and mine shafts necessary for LLNB roosts. The greatest potential for undetected roosts occurs on CNF land. The road closures on CNF land outlined in SECTION 1.4 and in the RA (URS 2003) will minimize the probability of increased human access and disturbance of LLNB in undetected roosts in these areas.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Agave in desert grasslands have evolved with fire, but unnaturally high fire frequency and intensity can lead to decline or elimination of agave populations. Furthermore, agave mortality from fire may affect the abundance and distribution of blooming agaves for a number of years, especially if there is high mortality within certain age and size classes.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.4g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. The action area for this species crosses private, state, and federal lands. Future federal actions on USFS land will be subject to Section 7 consultation but these actions will not be considered cumulative. Because the action area for this species includes a 40 mi (64 km) buffer, some of the future planned actions on private and state lands in southern Pima County and much of Santa Cruz County may be considered cumulative.

Although the amount of this future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). In the same time period, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000).

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase

into the foreseeable future. Additionally, agricultural, recreation, OHV use, grazing, and other activities continue to occur on private and state land and adversely affect LLNB and their habitats.

2.4h Effects Determination and Incidental Take

The potential disturbance of LLNB in undetected roosts from construction noise and potential mortality of transplanted forage species may affect, and is likely to adversely affect, this species.

No take of LLNB is anticipated as a result of the proposed action. First, noise disturbance will likely impact small numbers of individuals and will be short term in duration. Secondly, changes in agave and saguaro cacti distribution will be not be significant in any single location.

2.5 CHIRICAHUA LEOPARD FROG (*Rana chiricahuensis*) (Threatened)

2.5a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the CLF consists of all cienegas, pools, livestock tanks, and streams at elevations above 3,200 ft (975 m) in the Tumacacori and Atascosa/Pajarito mountains. The action area also includes the entire watersheds of these aquatic systems and lies almost entirely on CNF land. That portion of the action area not on CNF land is a considerable distance downstream of the proposed action.

2.5b Natural History and Distribution

CLF (Figure 16) are distinguished from other members of the leopard frog (*Rana pipiens*) complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background, dorsolateral folds that were interrupted and deflected medially, stocky body proportions, relatively rough skin on the back and sides, and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of one to two seconds in duration (Davidson 1996, Platz and Mecham 1979).

Figure 16. Chiricahua leopard frog.

CLF are riparian habitat generalists, occupying springs, cienegas, canals, small creeks, mainstem rivers, lakes and livestock tanks at elevations of 3,281 ft (1,000 m) to 8,890 ft (2,710 m) in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of Chihuahua, northern Durango and northern Sinaloa (Platz and Mecham 1984, Degenhardt et al. 1996, Sredl et al. 1997). Adult CLF are the most aquatic of all Arizona leopard frogs, requiring aquatic habitats for larval forms and semi-aquatic habitats for adult forms. CLF may breed anytime, but breeding in late spring and early summer is most common. Eggs are oviposited in shallow water attached to vegetation, or on bottom substrate. Tadpoles can metamorphose in as few as three months, but may overwinter and metamorphose the following spring. Because time from hatching to metamorphosis is shorter in warm water than cold water, water permanency is probably more important at higher elevations.

Heterogeneous habitat is important for leopard frog populations; shallow water with emergent vegetation is important for breeding and deeper water provides escape cover for adults. In Arizona, slightly more than half of known historic localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of extant populations in Arizona occupy stock tanks (Sredl and Saylor 1998). Although stock tanks provide refugia for frog populations and are important for this species in many areas, such tanks support only small populations and these habitats are very dynamic. Tanks often dry out during drought, and

flooding may destroy downstream impoundments or cause siltation, either of which may result in loss of aquatic communities and extirpation of frog populations. Periodic maintenance to remove silt from tanks also may cause a temporary loss of habitat and mortality of frogs.

CLF are rarely found in aquatic sites inhabited by non-native fish, bullfrogs (*Rana catesbiana*), and/or crayfish (*Oronectes virilis*). However, in complex systems or large aquatic sites, CLF may coexist with low densities of non-native predators (Bloomquist et al. 2002).

Where the species is extant, sometimes several small populations are found in close proximity, suggesting metapopulations are important for preventing regional extirpation (Sredl et al. 1997). Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl et al. 1997, Sredl and Howland 1994). CLF populations are often small and their habitats are dynamic, resulting in a relatively low probability of long-term population persistence. However, if populations are relatively close together and numerous, extirpated sites can be recolonized.

The range of the species is divided into two parts, including: (1) a southern group of populations (the majority of the range) located in mountains and valleys south of the Gila River in southeastern Arizona, extreme southwestern New Mexico, and Mexico; and (2) northern montane populations in west central New Mexico and along the Mogollon Rim in central and eastern Arizona (Platz and Mecham 1979). Historical records exist for Pima, Santa Cruz, Cochise, Graham, Apache, Greenlee, Gila, Coconino, Navajo, and Yavapai counties in Arizona, and Catron, Grant, Hidalgo, Luna, Soccoro, and Sierra counties in New Mexico (Sredl et al. 1997, Degenhardt et al. 1996). The distribution of the CLF in Mexico is unclear. The species has been reported from northern Sonora, Chihuahua, and Durango (Hillis et al. 1983, Platz and Mecham 1979, 1984) and, more recently, from Aguascalientes. However, Webb and Baker (1984) concluded that frogs from southern Chihuahua were not CLF. The taxonomic status of *chiricahuensis*-like frogs in Mexico from southern Chihuahua to Aguascalientes is unclear and in this region another leopard frog, *Rana montezumae,* may be mistaken for the CLF.

Recent evidence suggests a chytridiomycete skin fungi is responsible for observed declines of frogs, toads, and salamanders in portions of Central America (Panama and Costa Rica), South America (Atlantic coast of Brazil, Ecuador, and Uruguay), Australia (eastern and western states), New Zealand (South Island), Europe (Spain and Germany), Africa (South Africa, "western Africa", and Kenya), Mexico (Sonora), and the United States (8 states) (Speare and Berger 2000, Longcore et al. 1999, Berger et al. 1998). Ninety-four species of amphibians have been diagnosed as infected with the chytrid *Batrachochytrium dendrobatidis*. In Arizona, chytrid infections have been reported from four populations of CLF, as well as populations of Rio Grande leopard frog (*Rana berlandieri*), Plains leopard frog (*Rana blairi*), lowland leopard frog (*Rana yavapaiensis*), Tarahumara frog (*Rana tarahumarae*), canyon treefrog (*Hyla arenicolor*), and Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) (Davidson et al. 2000, Sredl and Caldwell 2000, Morell 1999). The disease was recently reported from a

metapopulation of CLF from New Mexico; that metapopulation may have been extirpated.

The role of the fungi in the population dynamics of the CLF is undefined; however, it may well prove to be an important contributing factor in observed population decline. Rapid death of recently metamorphosed frogs in stock tank populations of CLF in New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and CLF in Arizona and Sonora. However, in both cases, symptoms of moribund frogs matched those of chytridiomycosis. Chytrids were recently found in a specimen of Tarahumara frog collected during a die off in 1974 in Arizona. This earliest record for chytridiomycosis corresponds to the first observed mass die-offs of ranid frogs in Arizona (USFWS 2002c).

2.5c Critical Habitat

No critical habitat has been designated for this species.

2.5d Current Status Statewide

USFWS listed this species as threatened throughout its range in the southwestern United States and in Mexico on 13 June 2002 (USFWS 2002c). Potential threats to the species include disease, predation and possibly competition by non-native organisms, including fishes in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs, tiger salamanders (*Ambystoma tigrinum stebbinsi*), crayfish, and several other species of fishes, including, in particular, catfishes (*Ictalurus* spp. and *Pylodictus oliveris*) and trout (*Oncorhynchus* spp. (=*Salmo*) and *Salvelinus* spp.) (USFWS 2002c). For instance, in the Chiricahua region of southeastern Arizona, Rosen et al. (1996a) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported CLF. All waters, except three that supported introduced vertebrate predators, lacked CLF.

Human factors affecting the species include modification or destruction of habitat through water dams, water diversions, groundwater pumping, introduction of non-native organisms, woodcutting, mining, contaminants, urban and agricultural development, road construction, overgrazing and altered fire regimes. Additional human factors include over-collection for commercial and scientific purposes.

In Arizona, the species is extant in seven of eight major drainages of historical occurrence (Salt, Verde, Gila, San Pedro, Santa Cruz, Yaqui/Bavispe, and Magdalena river drainages), but appears to be extirpated from the Little Colorado River drainage on the northern edge of the range. Within the extant drainages, the species was not found recently in some major tributaries and/or from river mainstems. For instance, the species was not reported from 1995 to the present from the following drainages or river mainstems where it historically occurred: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek.

USFWS reports that CLF were observed at 87 sites in Arizona from 1994 to 2001, including 21 northern sites and 66 southern sites (USFWS 2002c). Many of these sites have not been revisited in recent years; however, evidence suggests some populations have been extirpated in the Galiuro and Chiricahua mountains. In 2000, the species was also documented for the first time in the Baboquivari Mountains, Pima County, Arizona (USFWS 2002c).

Intensive and extensive surveys were conducted by AGFD in Arizona from 1990 to 1997 (Sredl et al. 1997). Included were 656 surveys for ranid frogs within the range of the CLF in southeastern Arizona. Rosen et al. (1994, 1996a, 1996b), Hale (1992), Wood (1991), Clarkson and Rorabaugh (1989), and others have also extensively surveyed wetlands in southeastern Arizona. It is unlikely that many additional populations will be found there. A greater potential exists for locating frogs at additional sites in the northern region of Arizona, as several new populations have been discovered on the Coconino National Forest in 2000 and 2001 (USFWS 2002c).

The latest information for Arizona (USFWS 2002c) indicates the species is extant in all major drainages in Arizona and New Mexico where it occurred historically. However, it has not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, East Clear Creek, West Clear Creek, Silver Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, Sonoita Creek, Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. In many of these regions CLF were not found for a decade or more despite repeated surveys.

2.5e Environmental Baseline

The action area for this species lies within the Tumacacori EMA of the CNF. Within this EMA, CLF are present in Sycamore Canyon, Peña Blanca Spring, Hank & Yank Tank, and Bear Valley Tank (J. Rorabaugh, USFWS, pers. comm., 1 October 2002). Of these, Peña Blanca Spring and portions of Sycamore Canyon are downstream or near construction areas of the proposed action. Watershed condition is a function of percent groundcover present to dissipate rain and prevent excess erosion. Along the proposed ROW, watershed condition is satisfactory on the Sycamore Canyon watershed and the watershed immediately to the east, but unsatisfactory on the Peck Canyon watershed and the watershed on the northern boundary of the Tumacacori EMA. Peña Blanca Spring is not within a grazing allotment but is adjacent to Ruby Road. The spring is downstream of the Walker fire, a 16,369 acre (6,624 ha) human-caused fire along the international border. Portions of the Walker fire were very hot (especially near the international border and the upper slopes of ridges) while other areas (like Walker Canyon) burned relatively cool (T. Newman, CNF, pers. comm., 26 November 2002). While vegetation has begun to recover in some areas, other areas are highly susceptible to erosion due to lost groundcover (Figure 11).

The population in Sycamore Canyon is probably a source of immigrants to other suitable areas within the EMA (USFWS 2001b). Sycamore Canyon also is the only aquatic habitat within the EMA confirmed to contain the chytrid fungus (J. Rorabaugh, USFWS, pers. comm., 1 October 2002). While there are 17 historical records of CLF in the Atascosa and Pajarito mountains (USFWS 2001b), there are currently no plans for reintroducing CLF into any aquatic habitats in CNF (J. Rorabaugh, USFWS, pers. comm., 1 October 2002).

2.5f Effects of Proposed Action on the CLF

Direct Effects

Vehicle Collisions

No construction activities will occur within stock tanks, or other aquatic habitats; however, CLF may be present on land some distance away from these areas and construction traffic could result in vehicle collisions with individual CLF.

Indirect Effects

Habitat Modification

Some indirect impacts to CLF may result from modifications to its habitat caused by the construction of temporary access roads. The removal of vegetative cover for these roads will increase surface runoff and sediment transport and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997). The use of both existing and new roads by heavy equipment makes them less permeable because of compaction and crusting (Rostagno 1989). Compaction leads to reduced infiltration and an increase in the force of overland flow, which in turn leads to increased erosion. Increased erosion can accelerate sedimentation of deep pools used by CLF (Gunderson 1968). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). Because alignment of the structures is approximately 1 mi (1.6 km) from Sycamore Canyon, impacts from road erosion are expected to be insignificant in that area, and BMPs will minimize erosion into other aquatic systems closer to the proposed alignment. However, unusually large precipitation events may temporarily overwhelm BMPs and result in some increase in sediment transport.

Transport of Disease Agents

The construction of temporary roads will provide construction vehicles and personnel access to remote areas and potential CLF habitats not currently accessible by vehicles. Because these same construction vehicles and personnel will be used along the entire proposed ROW, there may be an increased possibility for the introduction of the chytrid fungus into aquatic habitats that do not presently contain the fungus. Chytrid fungus could be carried inadvertently in mud clinging to wheels, boots, or other equipment. The use of a diluted-bleach wash station when equipment and personnel move between wet zones will significantly reduce the potential for unintentional introduction of the disease to new aquatic habitats.

Increased Legal and Unauthorized Access to CLF Habitat
Recreationists may access CLF habitat, using roads constructed for the proposed action, even after the roads have been closed and revegetated. Unmanaged OHVs can damage riparian vegetation, increase siltation in pools, compact soils, disturb the water in stream channels, and crush CLF. Increased human access to these aquatic habitats also may lead to the introduction of non-native predators to streams and stock tanks or illegal killing or collection of CLF. Long-term monitoring and maintenance of road closures will minimize the probability of unauthorized access and thereby minimize any adverse effects associated with such access.

Accidental Wildfire
Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Roads constructed for the proposed action may allow the establishment or increased density of non-native grasses, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Wildfires could remove groundcover that is important in dissipating rainfall energy and reducing erosion.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.5g Cumulative Effects
Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. The action area for

this species crosses private, state, and federal lands. Future federal actions on USFS lands will be subject to Section 7 consultation but these actions will not be considered cumulative. Because the action area for this species includes the entire watersheds of the aquatic habitats on the CNF, some of the future planned actions on private and state lands in Santa Cruz County may be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew 29.3 percent (U.S. Census Bureau 2000). Despite being downstream of occupied and potential CLF habitat, an increase in regional population translates into an increased demand for recreational use of USFS lands.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.5h Effects Determination and Incidental Take

Potential vehicle impacts to dispersing CLF and increased transport of sediments into aquatic habitats may affect, and will likely adversely affect, this species.

No take of CLF is anticipated for the following reasons: (1) no construction activities will occur within occupied streams, stock tanks, or other CLF habitat; (2) implementation of BMPs will minimize erosion.

2.6 PIMA PINEAPPLE CACTUS (*Coryphantha scheeri* var. *robustispina*) (Endangered)

2.6a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential habitat for the PPC includes those areas of the proposed ROW from the TEP South Substation to an elevation of 4,600 ft (1,402 m) in the foothills of the Tumacacori Mountains.

2.6b Natural History and Distribution

The PPC (Figure 17) is small and round with finger-like projections. Adult cactus range in size from 1.8 in (4.6 cm) to 18 in (46 cm) in height. At the tip of each projection or tubercle is a rosette of 10–15 straw-colored spines with one central hooked spine. Plants can be single or multi-stemmed and produce bright yellow flowers after summer rains (Roller 1996).

Figure 17. Pima pineapple cactus.

Populations of PPC are known to occur south of Tucson, in Pima and Santa Cruz counties, Arizona and adjacent northern Sonora, Mexico. It is distributed at low densities within the Altar and Santa Cruz Valleys, as well as in low-lying areas connecting these valleys.

PPC populations are generally found in open patches within semidesert grassland and Sonoran desertscrub plant communities (Brown 1994). They are typically found on flat alluvial bajadas that are comprised of granitic material and are most abundant within the ecotone between the grassland and desertscrub biomes (Roller 1996). This plant is found at elevations between 2,362 ft (720 m) and 4,593 ft (1,400 m). PPC are not typically found in washes or riparian areas.

2.6c Critical Habitat

No critical habitat has been designated for this species.

2.6d Current Status Statewide

USFWS listed PPC as endangered throughout its range on 25 October 1993 (58 FR 49875). Habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution, plant species rareness, illegal collection and difficulties in protecting areas large enough to maintain functioning populations are factors that contributed to the current endangered status of this species. PPC densities vary throughout its range with the highest densities occurring south of Tucson through the Santa Cruz Valley (to the town of Amado and surrounding developed parts of Green Valley and Sahuarita, and parts of the San Xavier District of the Tohono O'odham

Nation). Continued urbanization, farm and crop development, mine expansion, and invasion of non-native species are primary threats to PPC populations. Overgrazing by livestock, illegal plant collection, and fire-related interactions involving non-native Lehmann's lovegrass may also have negative impacts on PPC (USFWS 1993b).

2.6e Environmental Baseline

The environmental baseline for PPC evaluates the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem within the action area. Due to the limited information on PPC population distributions under current habitat conditions, it is difficult to determine the current status of the plant statewide. USFWS has insufficient data to determine if the majority of populations of PPC can be sustained under current reduced and fragmented conditions.

Based on monitoring results, the range-wide status of PPC appears to have been recently affected by threats that completely alter or considerably modify more than a third of the surveyed habitat and have caused the elimination of nearly 60 percent of documented locations (USFWS 2001c). Dispersed, patchy clusters of individuals are becoming increasingly isolated as urban development, mining, and other commercial activities continue to detrimentally impact PPC habitat.

The proposed project area is primarily undeveloped, contains existing electrical distribution lines and associated roads (Figure 14) and is in close proximity to low-density housing developments and the Mission Mine Complex.

Surveys for PPC were conducted using an approved survey protocol (Roller 1996) that established a belt transect across identified potential habitat with each surveyor covering a 16 ft (5 m) to 23 ft (7-m) swath. One survey pass of the entire corridor was conducted, with intensive searches at identified PPC individuals. Surveys on state, private, and BLM land covered a 200 ft (61 m) wide area centered on the proposed structure alignment. On the CNF, the coverage was expanded to 750 ft (229 m) wide. All detected PPC locations were recorded using a Global Positioning System (GPS) unit. To determine the extent of proposed disturbance to PPC habitat, recent aerial photography was used to eliminate areas not suitable for PPC, including slopes over 15 percent, high clay or bedrock soils, washes, and previously disturbed areas such as roads, buildings, mining disturbance, etc. During surveys conducted between July 2002 and March 2003, 70 PPC were detected within the 125 ft (38.1 m) ROW between the TEP South Substation and the CNF boundary (HEG 2003, unpublished data). Based the acreage surveyed, the density of PPC within this area is approximately 0.14 PPC/ acre (0.34 PPC/ha).

2.6f Effects of Proposed Action on the PPC

Direct Effects

Because the precise locations of structures and access roads can be modified to avoid sensitive resources, the proposed action will not result in the loss of any individual PPC. All known individuals of PPC near construction areas and along main access routes will be clearly marked and protected to avoid impacts.

Indirect Effects

Modification of Habitat

The construction of new access roads and the installation of structures will alter PPC seed sources in unoccupied, but potential, PPC habitat. Construction vehicles will compact soil, changing water infiltration rates, and road construction will dramatically alter soil structure and seed source depth. Disturbance of structure installation sites and many access roads will be temporary and will regenerate as potential PPC habitat in the future. Some recent observations indicate that PPC may readily establish in recently disturbed habitats (USFWS 2002d), but these areas must be allowed to recover for many years, even decades.

Detailed analysis of impacts to habitat for this species is ongoing. To mitigate for the potential loss of PPC habitat, TEP will purchase credits in a USFWS-approved conservation bank for PPC at a ratio determined in consultation with USFWS.

Increased Legal and Unauthorized Access to PPC Habitat

Much of the proposed corridor through PPC habitat parallels existing electrical distribution lines with existing utility access roads; however, new access roads will be constructed, potentially resulting in unintended access into previously undisturbed PPC habitat, especially by OHV users. Off-road travel could directly impact additional PPC or impede seedling establishment through changes in soil characteristics.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). It is widely regarded that most succulent species are negatively impacted by fire and are not fire-adapted (Rogers and Steele 1980, McLaughlin and Bowers 1982). Plants die by direct heating of the fire, or later through indirect fire effects such as grazing of spineless plants, post-fire increase in plant tissue temperature, or the introduction of disease or infestation into weakened plants (Thomas 1991). The sparse distribution of this species across the landscape, however, can mean that loss of a few individuals to fire can greatly affect the range and density of local PPC populations.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977).

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.6g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Under Section 9 of the ESA, the taking of listed animals is specifically prohibited, regardless of land ownership status. For listed plants, these prohibitions and the protection they afford do not apply. Listed plant species are protected only from deliberate removal from federal lands. There is no protection against removal from, or destruction of, plants on private land under the ESA by a landowner.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). Because of growth rates and the development pressures of nearby Tucson and Sahuarita, Arizona, it is foreseeable that some lands adjacent to the proposed ROW will be developed. These developments will likely include increases in associated infrastructure such as roads, groundwater use, and commercial services, all resulting in the degradation of PPC habitat.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase. Additionally, agricultural, recreation, OHV use, grazing, and other activities continue to occur on private and state lands and adversely affect PPC and its habitat.

2.6h Effects Determination

The disturbance of potential PPC habitat may affect, and is likely to adversely affect the species through hindering seedling establishment. The adverse affects to the species will be mitigated through the purchase of mitigation bank credits.

2.7 SONORA CHUB (*Gila ditaenia*) (Threatened)

2.7a Action Area

The action area means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. In streams, the action area is often much larger than the area of the proposed action because impacts in the watershed may be concentrated in the stream and actions within the stream may be carried downstream well outside of the immediate project area. The action area for the Sonora chub is the entire Sycamore Canyon watershed.

2.7b Natural History and Distribution

The Sonora chub (Figure 18) is a stream-dwelling member of the minnow family (Cyprinidae) and can achieve total lengths of 7.8 in (200 mm) (Hendrickson and Juarez-Romero 1990). In the United States, it typically does not exceed 5 in (125 mm) (Minckley 1973), although specimens up to 6 in (150 mm) have been measured. The Sonora chub has 63 to 75 scales in the lateral line, and the scales bear radii in all fields. The mouth is inferior and almost horizontal. There typically are eight rays in the dorsal, anal, and pelvic fins, although the dorsal fin can have nine (Miller 1945), and the anal and pelvic fins seven (Rinne 1976). The body is moderately chubby and dark-colored, with two prominent black bands above the lateral line and a dark, oval basicaudal spot. Breeding individuals are brilliantly colored (Miller 1945).

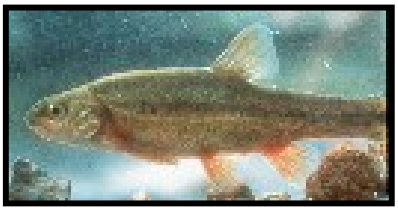

Figure 18. Sonora chub.

Sonora chub spawn at multiple times from spring through summer, most likely in response to flooding during the spring and summer rains (Henderickson and Juarez-Romero 1990). Although Sonora chub is regularly confined to pools during arid periods, it prefers riverine habitats. In lotic waters in Mexico, Henderickson and Juarez-Romero (1990) commonly found Sonora chub in pools less than 2 ft (0.61 m) deep, adjacent to or near areas with a fairly swift current, and over sand and gravel substrates. It was less common in reaches that were predominately pools with low velocities and organic sediments. Sonora chub are adept in exploiting small marginal habitats and can survive under severe environmental conditions. They can maneuver upstream past small waterfalls and other obstructions to colonize newly-formed habitats (Carpenter and Maughan 1993).

Based on collection dates of young-of-the-year (YOY), spawning occurs in early spring (Minckley 1973). Larval and juvenile Sonora chub were found in Sycamore Creek and in a tributary to Rio Altar in November, which indicated breeding was apparently not limited by season. Adults with breeding coloration were also taken during these periods (Hendrickson and Juarez-Romero 1990). In Sycamore Creek, adults with breeding colors were seen from April through September in 1990 and 1991. Larvae and juveniles 0.6 in (15mm) to 0.7 in (18 mm) were seen in April, May, and September (Carpenter 1992), suggesting that spawning occurred after the spring and summer rains. Bell (1984) also

noted young after heavy flooding and suggested that post-flood spawning is a survival mechanis. During spawning, Sonora chub broadcast eggs onto fine gravel substrates in slowly flowing water for hatching and development. There are no nests built, and no parental care given. Larvae use shallow habitats at pool margins where they feed on microscopic organisms and algae. As adults they can exploit shallow to deep pools, runs, and riffles as available. In 2000, multiple spawning in California Gulch was documented (USFS 2000).

Sonora chub respond to wet and dry cycles by expanding into riffles, runs, and pools during wet periods, and then shrinking back to deep pools as the stream dries. A substantial number of Sonora chub die when they become trapped in habitats that do not sustain perennial water during arid periods (Carpenter and Maughan 1993). Recolonization is dependent on individuals that survived the dry period. The species has an amazing capacity for reproduction and recruitment as its habitat expands. It can explode from a small number of individuals occupying a few pools to a population numbering in the thousands and occupying newly-wetted habitats in just a few weeks or months. The capability of the population to increase by several orders of magnitude within a few months is most likely an adaptation to the harsh climate and intermittent nature of southwestern riparian systems, which has allowed the Sonora chub to survive until present (Bell 1984).

2.7c Critical Habitat

Critical habitat was designated at the time of federal listing to include Sycamore Creek, extending downstream from and including Hank and Yank Spring, to the United Staes-Mexico border (Figure 3, Ruby Quadrangle). Also designated was the lower 1.2 mi (2 km) of Peñasco Creek, and the lower 0.25 mi (0.4 km) of an unnamed stream entering Sycamore Creek from the west, about 1.5 mi (2.4 km) downstream from Hank and Yank Spring. In addition to the aquatic environment, critical habitat includes a 39.3 ft (12 m) wide riparian area along each side of Sycamore and Peñasco creeks. This riparian zone is essential to maintain the creek ecosystem and stream channels and the conservation of the species (USFWS 1986). The proposed action does not pass through designated Sonora chub critical habitat but is located approximately 1 mi (1.6 km) upstream of critical habitat.

2.7d Current Status Statewide

The Sonora chub was listed in the United States as threatened on 30 April 1986 (51 FR 16042) with critical habitat. The species is also listed by Arizona as a "species of special concern" (AGFD 1996), as a threatened species by the Republic of Mexico (Secretaria de Desarrollo Social 1994), and included on the Regional Forester's list of sensitive species (USFS 1999).

Sonora chub is locally abundant in Sycamore Canyon and has been found as far north in the canyon as Casita Spring (T. Newman, CNF, pers. comm. 13 May 2002), although the habitat is limited in extent (Minckley and Deacon 1968). In Mexico, it is found in the Magdalena and Altar rivers, where it is considered relatively secure (Henderickson and Juarez-Romero 1990). In 1995, Sonora chub were found in California Gulch (AGFD

1995a). The overall estimated current chub habitat is 10 mi (16.1 km) length of Sycamore Creek and California Gulch, including a 39 ft (12 m) wide riparian area along each side of Sycamore and Peñasco creeks. A recovery plan was written in October 1992 (USFWS 1992).

Potential threats to Sonora chub are related to additional watershed developments, such as grazing, mining, road construction, and agricultural development, as well as predation by non-native vertebrates such as green sunfish (Minckley 1973) and bullfrogs (AGFD 1988). The green sunfish was the last non-native fish recorded in Sycamore Creek prior to 1989 (USFWS 1999b)

2.7e Environmental Baseline

The action area for this species lies within the Tumacacori EMA of the CNF. There is no authorized livestock grazing immediately adjacent to Sycamore Creek from the United Satates - Mexico border to the corrals north of Ruby Road. A livestock exclosure encompassing approximately 2,175 acres (880 ha) was completed around this area in 1998. Furthermore, roadways in Sycamore Canyon south of Ruby Road are closed to all vehicles, and Casita Spring, north of the corrals, is also fenced to exclude livestock. Both exclosures are periodically checked and maintained by CNF personnel. Violations of the road closure were recorded in 1999 and 2000 (CNF 2000).

The Sycamore Creek Watershed consists of 16,645 acres (6,737 ha) within the Tumacacori EMA and is in satisfactory condition. The Sycamore Canyon watershed lies within the Bear Valley allotment. This allotment is permitted for 350 cattle, but use of the area in 2002 was projected to be only 200 cattle. The range condition on the Bear Valley allotment is moderately high, but with an unknown trend.

CNF personnel have conducted 6 years of pool surveys in Sycamore Canyon to document trends that may indicate whether habitat for the Sonora chub is increasing, decreasing, or remaining static. These surveys record pool area index (surface area of pools per run) and presence/absence of Sonora chub within runs. In 2002 the pool index showed a 50 percent decrease from the previous five year average. The pool area index in 2001 was more than double the previous five year average.

Between 1997-2001, Sonora chub occupied most of the available pools. In 2002, the number of occupied pools was the lowest recorded during the six year period. This reduced occupancy may be because of smaller, shallower pools being available in 2002, and, thus, Sonora chub may have been killed by predation or some other factor, such as low oxygen levels, prior to the survey (T. Newman, CNF, pers. comm., 9 August 2002). Newman believes there are sufficient numbers of Sonora chub surviving in available pools to fill the available habitat once rains occur. Once pools are connected, Sonora chub move into the newly available habitat. The effect of movement can be most easily seen in the information on the Ruby Road upstream segment. Even though this is a short stream segment and only has a few pools, it has been occupied four of the six years covered by these surveys. Despite having no occupied pools for two years (1999 and 2000), when conditions improved in 2001, the majority of the pools were occupied.

2.7f Effects of Proposed Action on the Sonora Chub and Critical Habitat

Direct Effects

No direct effects to the Sonora chub are anticipated as a result of the proposed action because construction activities will not occur within occupied or potential Sonora chub habitat.

Indirect Effects

Modification of habitat

Indirect impacts to Sonora chub may result from modifications to habitat from the construction of access roads and installation of structures. The removal of vegetation for roads and structures will increase surface runoff and sediment transport, and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997). The use of roads by heavy equipment makes them less permeable because of compaction and crusting (Rostagno 1989). Compaction leads to reduced infiltration and an increase in the force of overland flow, which in turn leads to increased erosion.

Increased erosion could accelerate sedimentation of deep pools. As pools become shallower, water temperature rises. Warmer water temperatures may increase the impact of parasites or diseases within the chub population (USFWS 2001b). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). High-energy overland water flow increases erosion and downcutting of streams, and can create damaging debris flows. While BMPs will minimize impacts, some increase in erosion into Casita Spring may occur during unusually large precipitation events because of the spring's proximity to construction areas.

Increased Legal and Unauthorized Access to Sonora Chub Habitat

No new roads are proposed within the Sycamore Canyon exclosure; however, new roads are proposed near potential Sonora chub habitat upstream of Ruby Road, including a road proposed 656 ft (200 m) north of Casita Spring. Future unauthorized access to closed roads in this area could damage riparian vegetation, compact soils, and increase siltation in pools and stream channels. Increased human access to these aquatic habitats also may lead to the introduction of non-native predators to streams and stock tanks or illegal killing or collection of Sonora chub. The monitoring and maintenance of road closures will minimize the probability of unauthorized access and thereby minimize any adverse effects associated with such access.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Roads constructed for the proposed action also may allow the establishment or increased density of non-native grasses, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995).

Wildfires could remove groundcover that is important in dissipating rainfall energy and reducing erosion.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape, and may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.7g Cumulative Effects
Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Because the action area for this species is entirely on USFS land, all activities are subject to the consultation requirements established under Section 7 of the ESA, and, therefore, are not considered cumulative to the proposed action.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite being outside of occupied and potential chub habitat, an increase in regional population translates into an increased demand for recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.7h Effects Determination and Incidental Take
<u>Effects to Species</u>
The transport of sediments into Casita Spring and upper Sycamore Canyon may affect the Sonora Chub, and is likely to adversely affect the species.

No take of Sonora chub is anticipated for the following reasons: (1) no construction activities will occur within occupied streams, and (2) BMP erosion control measures will minimize sediment transport.

Effects to Critical Habitat

No adverse modification or destruction of Sonora chub critical habitat is anticipated because BMPs will be in place to minimize erosion and because alignment of the structures is approximately 1 mi (1.6 km) from Sycamore Creek and Hank and Yank Spring.

2.8 JAGUAR (*Panthera onca*) (Endangered)

2.8a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Because of the large movements possible by the jaguar and historical records for the species in a variety of habitats, the action area for the jaguar considered for the proposed action includes most of western Santa Cruz and southern Pima counties.

2.8b Natural History and Distribution

Jaguars (Figure 19) are the largest species of cat now native to the Western Hemisphere. Jaguars are large muscular cats with relatively short massive limbs, a deep-chested body, and cinnamon-buff in color with many black spots. Its range in North America includes Mexico and portions of the southwestern United States (Hall 1981). A number of jaguar records are known for Arizona, New Mexico, and Texas. Additional reports exist for California and Louisiana. Records of the jaguar in Arizona and New Mexico have been attributed to the subspecies *Panthera onca arizonensis*. The type specimen of this subspecies was collected in Navajo County, Arizona, in 1924 (Goldman 1932). Nelson and Goldman (1933) described the distribution of this subspecies as the mountainous parts of eastern Arizona north to the Grand Canyon, the southern half of western New Mexico, northeastern Sonora, and, formerly, southeastern California. The records for Texas have been attributed to another subspecies *P. o. veraecrucis*. Distribution of this subspecies was described by Nelson and Goldman (1933) as the Gulf slope of eastern and southeastern Mexico from the coast region of Tabasco, north through Vera Cruz and Tamaulipas, to central Texas. Swank and Teer (1989) indicated the historical range of the jaguar included portions of Arizona, New Mexico, and Texas. These authors consider the current range to be central Mexico through Central America and into South America as far as northern Argentina.

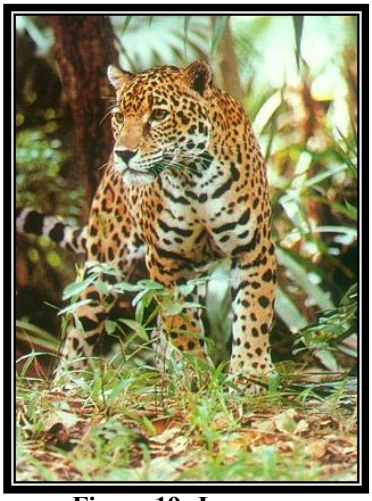

Figure 19. Jaguar.

Swank and Teer (1989) stated the United States no longer contains established breeding populations of jaguar, which probably disappeared from the United States in the 1960s. According to these authors, the jaguar prefers a warm tropical climate and is usually associated with water, and rarely found in extensive arid areas. Goldman (1932) believed the jaguar was a regular, but not abundant, resident in southeastern Arizona. Hoffmeister (1986) considered the jaguar an uncommon resident species in Arizona. He concluded that the reports of jaguars between 1885 and 1965 indicated a small but resident population once occurred in southeastern Arizona. Brown (1983a) suggested the jaguar in Arizona ranged widely throughout a variety of habitats from Sonoran desert scrub through subalpine conifer forest. Most of the records were from Madrean evergreen-woodland, shrub-invaded semidesert grassland, and along rivers.

Brown (1983a) presented an analysis suggesting there was a resident breeding population of jaguars in the southwestern United States at least into the 20th century. USFWS (1990) recognized that the jaguar continues to occur in the American southwest as an occasional wanderer from Mexico. Currently, breeding population of jaguar are unknown in the United States.

In Arizona, the gradual decline of the jaguar appeared to be concurrent with predator control associated with land settlement and the development of the cattle industry (Brown 1983a, USFWS 1990). Lange (1960) summarized the jaguar records from Arizona, and between 1885 and 1959 the reports consisted of 45 jaguars killed, six sighted, and two recorded by sign. Brown (1991) related that the accumulation of all known records indicated a minimum of 64 jaguars were killed in Arizona after 1900.

2.8c Critical Habitat

No critical habitat has been designated for this species.

2.8d Current Status Statewide

The jaguar was initially listed as endangered from the United States. - Mexico border southward to include Mexico and Central and South America (37 FR 6476, 1972; 50 CFR 17.11, August 1994). As a result of a petition, the jaguar was proposed as endangered in the United States (59 FR 35674; July 13, 1994). In a Federal Register notice dated 22 July 1997, the jaguar was listed as an endangered species in the United States (62 FR 39147).

The most recent records of jaguars in the United States are from Arizona. In 1971, a jaguar was taken east of Nogales and in 1986 one was taken from the Dos Cabezas Mountains. The latter reportedly had been in the area for about a year before it was killed. AGFD (1988) cited two recent reports of jaguars in Arizona. The individuals were considered to be transients from Mexico. One report (1987) was from an undisclosed location. The other report was from 1988, when tracks were observed for several days prior to the treeing of a jaguar by hounds in the Altar Valley, Pima County. An unconfirmed report of a jaguar at the Coronado National Memorial was made in 1991. In 1993, an unconfirmed sighting of a jaguar was reported for Buenos Aires National Wildlife Refuge. In March 1996, the presence of a jaguar was confirmed through photographs made in the Peloncillo Mountains of Arizona and New Mexico (Glenn 1996). AGFD reported a jaguar sighting in the Baboquívari Mountains in 1996, and in the fall of 1997, one was reported from the Cerro Colorado Mountains of southern Arizona. A jaguar was recently documented (December 2001) in the Atascosa Mountains within about 2 mi (3 km) of the proposed action.

2.8e Environmental Baseline

The Tumacacori EMA is the location of recent reports of jaguars in the United States. This area continues to include the most likely habitat that will support the existence of jaguars in the United States. Many of the larger canyon bottoms in the Tumacacori EMA contain substantial cover and could act as travel corridors for dispersing jaguars. It is believed that all recent sightings of jaguars in Arizona are males dispersing north from

the northern most breeding population in Mexico in an effort to find unoccupied habitat (B. VanPelt, AGFD, pers. comm., 3 October 2002). Because no breeding pairs are thought to exist north of the United Sates-Mexico border, conservation of the Mexican population is vital to the future presence of jaguars in Arizona.

Under the leadership of AGFD and New Mexico Department of Game and Fish, a conservation agreement and strategy has been prepared to address the conservation of the jaguar in Arizona and New Mexico. This agreement established an interstate/intergovernmental Jaguar Conservation Team under a Memorandum of Agreement (MOA). This MOA has been signed by various state and federal cooperators and local and tribal governments with land and wildlife management responsibilities in the geographic area of concern. The Jaguar Conservation Agreement and Strategy serves as a mechanism for implementation of actions for the protection and conservation of the jaguar, while providing a template for the recovery of the species until a recovery plan is prepared and adopted.

The Conservation Agreement established procedures for reporting and evaluating jaguar sightings and compiling distribution and occurrence information, investigation of livestock depredation, evaluation of habitat suitability, development of education materials, and other activities. The Jaguar Conservation Agreement also provides for participation by interested private citizens and organizations. CNF grazing allotment permitees are participating in this process.

The December 2001 sighting mentioned earlier came from a remote camera operated under the direction of the Jaguar Conservation Team (S. Schwartz, AGFD, pers. comm., 17 September 2002). Currently, 14 remote cameras are positioned along the United States-Mexico border in an attempt to document movement of jaguars in and out of Arizona (J. Childs, Jaguar Conservation Team, pers. comm., 3 October 2002).

2.8f Effects of Proposed Action on the Jaguar

Direct Effects

Construction Noise and Activity

Because jaguars are primarily nocturnal, disturbance from construction activities, even in suitable dispersal habitat, is unlikely. The greatest likelihood of noise disturbance will result from the use of helicopters during early morning or late evening hours. However, because of the linear nature of the proposed action, any noise disturbance will be widely distributed and relatively short term in any location. Any jaguar within the action area will likely avoid construction sites. The use of additional remote cameras to monitor the United States-Mexico border south of the proposed action also will minimize the possibility of construction activities affecting breeding jaguars.

Indirect Effects

Habitat Modification and Fragmentation

Roads can reduce habitat value because of habitat fragmentation and edge effects. Some studies have shown that a few large areas of low road density, even in a landscape of high average road density, may be the best indicator of suitable habitat for large vertebrates (Rudis 1995). Because construction activities within riparian corridors or other major canyons will be minimal and widely distributed, no adverse impacts to the composition or structure of jaguar movement corridors or fragmentation of habitat is anticipated. Furthermore, access and construction roads for the proposed action commonly are spurs off existing roads and range between 500 ft (152 m) and 1,000 ft (305 m) in length, which do not isolate or separate habitat patches.

While access roads and structure site construction could degrade the habitats of jaguar prey species, effects on the prey base are difficult to quantify. The primary jaguar prey species in Arizona is deer (*Odocoileus* spp.), which have relatively large home ranges. Road-avoidance behavior (up to distances of 300 ft [90 m] to 600 ft [180 m]) is common in large mammals (Lyon 1983), including those species that may serve as prey for jaguars. Because of the linear nature of the proposed action, impacts to deer habitat will be widely distributed and relatively minor in any single area.

Increased Legal and Unauthorized Access to Jaguar Habitat

Jaguars appear to be relatively tolerant of some level of human activity (B. VanPelt, AGFD, pers. comm., 3 October 2002) and have been documented using areas that have recreational and agricultural activities occurring on a regular basis. However, increased human access to potential jaguar habitat through the use of temporary proposed construction roads could reduce the quality of the habitat. The road closure techniques outlined in the SECTION 1.4 and the RA (URS 2003) will minimize unintended uses of these roads.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, jaguars will not likely be directly impacted by wildfires; however, these wildfires could potentially alter or destroy portions of prey species habitat. While the short-term effects of wildfires may affect prey species through loss of forage from the fire, increased herbaceous production in the years following a fire may improve habitat in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape. The fire

prevention measures being developed for the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.8g Cumulative Effects
Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species encompasses private, state, and federal lands, the habitat with the highest potential for occupancy by jaguars occurs on USFS land in Santa Cruz County. Future federal actions on these lands will be subject to Section 7 consultation; these actions will not be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.8h Effects Determination and Incidental Take
Construction noise and activity associated with the proposed action may affect the jaguar, but it is not likely to adversely affect the species because any disturbance will be widely distributed and short term in duration.

Because the proposed action is not likely to adversely affect the jaguar, no take is anticipated.

2.9 GILA TOPMINNOW (*Poeciliopsis occidentalis occidentalis*) (Endangered)

2.9a Action Area

The action area includes all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. In streams, the action area is often much larger than the area of the proposed action because impacts in the watershed may be concentrated in the stream and actions within the stream may be carried downstream well outside of the immediate project area. The action area for the Gila topminnow is the entire Santa Cruz River watershed.

2.9b Natural History and Distribution

The Gila topminnow (Figure 20) was originally described by Baird and Girard (1853) as *Heterandria occidentalis* from a specimen collected in 1851 from the Santa Cruz River near Tucson. It was redescribed by Hubbs and Miller (1941) as *Poeciliopsis occidentalis*. As with all species in the family Poeciliidae, the Gila topminnow exhibits sexual dimorphism. Both males and females are tan to olive-bodied and usually white on the belly. Scales of the dorsum are darkly outlined and the fin rays contain melanophores, although lacking in dark spots. Dominant sexually mature males are often blackened, with some gold on the pre-dorsal midline, orange at the base of the gonopodium, and exhibits bright yellow pelvic, pectoral, and caudal fins (Minckley 1973). Females remain drab in coloration upon reaching maturity and throughout their life. All male poeciliids have a modified anal fin (gonopodium) used to fertilize the female internally.

Figure 20. Gila topminnow

Habitat requirements of *P. o. occidentalis* are broad. The species prefers shallow, warm, fairly quiet water; however, they can become acclimated to a much wider range of conditions. Both lentic habitats and lotic habitats with moderate current are easily tolerated. Temperatures from near freezing under ice to 98.6 degrees F (37 degrees C) have been reported, with a maximum tolerance of 109.4 degrees F (43 degrees C) for brief periods (Heath 1962). Gila topminnows can live in a wide range of water chemistries, with recorded pH values from 6.6 to 8.9, dissolved oxygen readings from 2.2 to 11 milligrams/liter (Meffe et al. 1983), and salinities from very dilute to sea water (Schoenherr 1974). The widespread historic distribution of Gila topminnows throughout rivers, streams, marshes, and springs of the Gila River Basin is evidence for their tolerance of these environmental extremes. One reestablished population (Mud Springs) survived for 16 years in a simple cement-watering trough before being moved.

Meffe et al. (1983) reported that topminnows can tolerate almost total loss of water by burrowing into the mud for 1-2 days. Preferred habitats contain dense mats of algae and debris, usually along stream margins or below riffles, with sandy substrates sometimes covered with organic mud and debris (Minckley 1973). Topminnows are usually found in the upper third of the water column and young show a preference for the warmest and shallowest areas (Forrest 1992). Simms and Simms (1992) found topminnows occupying pools, glides, and backwaters more frequently than marshes or areas of fast flow.

According to Schoenherr (1974), the spring-heads presently occupied by Gila topminnows are questionable as preferred habitat. Destruction of historically occupied habitats such as the marshes, sloughs, backwaters, and edgewaters of larger rivers and presence of non-native fish in such habitats that remain has undoubtedly forced Gila topminnow out of their preferred historic habitats and into the spring-heads and smaller erosive creeks we see them in today. Their tolerance of conditions in these habitats has allowed them to maintain populations with less impact from non-native fishes.

Gila topminnows are viviparous fish, meaning embryos grow and mature within the female and are born living. Eggs are fertilized internally through deposition of spermatophores (packets of sperm) into the female genital pore by the male gonopodium. Female Gila topminnow can store spermatozoa for several months, and may produce up to 10 broods after being isolated from males (Schultz 1961). Female Gila topminnows also exhibit superfetation in which 2 or more groups of embryos at different stages develop simultaneously. Females of the genus *Poeciliopsis* generally carry only 2 stages, although some *P. o. occidentalis* females have been shown to carry 3 stages for a few days when population densities are low. The mean interval between broods is 21.5 days (Schoenherr 1974). Brood size ranges from 1-31 dependent upon female standard length (SL) (Constantz 1974; Schoenherr 1974, 1977). Under optimum laboratory conditions, *Poeciliopsis* can produce 10 broods per year at intervals of 7 to 14 days (Schultz 1961). Sexual maturity can be attained as early as 2 months or as late as 11 months following birth, dependent upon the season of birth (Schultz 1961; Constantz 1976, 1979; Schoenherr 1974).

Breeding occurs primarily during January through August, but in thermally constant springs, young may be produced throughout the year (Heath 1962; Minckley 1973; Schoenherr 1974). During the peak of the breeding season up to 98 percent of mature females are pregnant (Minckley 1973). Dominant males turn black, defend territories, and court females. Smaller subordinate males do not turn black or defend territories. Instead, they take on a "sneaking" mating strategy where they attempt to mate with uncooperative females while the dominant male is busy elsewhere. Subordinate males have a longer gonopodium, which may have an adaptive benefit for this type of mating strategy (Constantz 1989). However, if the larger territorial males are removed, smaller males will become dominant, take on breeding coloration, and defend territories (Constantz 1975; Schoenherr 1977). Brood size and the onset of breeding in topminnows can be influenced by several factors including food abundance, photoperiod, temperature, predation upon the population, and female size. Increased food supply and larger female size are believed to contribute to the greater fecundity seen in topminnows from Monkey Spring canal compared with topminnows from Monkey Spring headspring (Constantz 1974, 1979; Schoenherr 1974, 1977). Sex ratios in stabilized populations nearly always favor females, varying from 1.5 to 6.3 per male (Schoenherr 1974).

Gila topminnows are opportunistic omnivorous feeders, having a gut length 1.5 to 2 times SL of the individual (Schoenherr 1974). They have weakly spatulate dentition characteristic of an omnivorous diet. Primary food items include detritus, vegetation,

amphipods, ostracods, insect larvae, and rarely, other fish (Schoenherr 1974; Gerking and Plantz 1980; Meffe et al. 1983; Meffe 1984).

Gerking and Plantz (1980) noted that Gila topminnows prefer to eat large prey, but prey sizes are limited by mouth size. Schoenherr (1974) observed that individual fishes in complex habitats with several food resources present will select and focus on different items. He suggested that variation in feeding among individuals prevents over-utilization of a single resource, thus enhancing survival potential of the species.

In the United States, this species currently occurs in the Gila River drainage, Arizona, particularly in the upper Santa Cruz River, Sonoita and Cienega creeks, and the middle Gila River. The Gila topminnow is restricted to 14 natural localities in Arizona. In Mexico, the species occurs in the Río Sonora, Río de la Concepción, and Santa Cruz River but are not listed under the ESA. Gila topminnows occupy a variety of habitats, including: springs, cienegas, permanent and interrupted streams, and margins of large rivers. Habitat alteration and destruction, and introduction of predatory non-native fish, (principally western mosquitofish [*Gambusia affini*]) is the main reason for decline of the Gila topminnow.

2.9c Critical Habitat

No critical habitat has been designated for this species.

2.9d Current Status Statewide

The United States population of the Gila topminnow was federally listed as an endangered species in 1967 (USDOI 1967). The original recovery plan for Gila topminnow listed 10 extant natural populations: Monkey Spring, Cottonwood Spring, Sheehy Spring, Sharp Spring, Santa Cruz River near Lochiel, Redrock Canyon, Cienega Creek, Sonoita Creek (presumably including localities above and below Patagonia Lake), Salt Creek, and Bylas Springs (USFWS 1984). Gila topminnows were also known from Middle Spring (also known as SII or Second Spring) on the San Carlos Apache Indian Reservation (Meffe et al. 1983). Middle Spring was considered part of the Bylas Springs complex in the earlier recovery plan.

Since 1984, Gila topminnows have been discovered or rediscovered at 4 additional locations: North Fork of Ash Creek in 1985 (Jennings 1987), Fresno Canyon in 1992, Santa Cruz River north of Nogales in 1994, and Coal Mine Canyon in 1996 (Weedman and Young 1997). However, Gila topminnow were last collected from the North Fork of Ash Creek in 1985 and from Sheehy Spring in 1987. They have also been very rare or absent during recent surveys (last 5 years) of Sonoita Creek above Patagonia Lake and Santa Cruz River near Lochiel. Mosquitofish are quite common in both areas. Topminnows were extirpated from 1 of the original 10 localities, Salt Creek, by mosquitofish (Marsh and Minckley 1990), but the stream was renovated and restocked with Gila topminnows from Middle Spring. Subsequently, mosquitofish were found in the stream and it was again renovated and restocked with topminnows from Bylas Spring. Thus, there are 14 naturally occurring localities (considering Sonoita Creek above and

below Patagonia Lake as 2 separate localities) currently known to support Gila topminnows in the United States.

Eleven of the naturally occurring locations currently supporting Gila topminnows are in the Santa Cruz River system: Redrock Canyon, Cottonwood Spring, Monkey Spring, upper Sonoita Creek, Fresno Canyon, Coal Mine Canyon, lower Sonoita Creek, Santa Cruz River north of Nogales, Cienega Creek, Sharp Spring, and the upper Santa Cruz River. The 2 remaining localities (Bylas Springs and Middle Spring) and Salt Creek are next to the Gila River on the San Carlos Apache Indian Reservation. Bylas Springs has been unsuccessfully poisoned twice to remove mosquitofish (Meffe et al. 1983; Brooks 1985; Marsh and Minckley 1990). Another attempt at renovation of Bylas Springs was done by USFWS Arizona Fishery Resource Office and has so far been successful. The population at Middle Spring was eliminated by lack of water during the summer of 1989, but was recently reestablished (following construction of additional pool habitat) with Gila topminnows from the original Middle Spring population held at Roper Lake State Park. Salt Creek has also been renovated and restocked with topminnows originally from Bylas Spring.

As part of past recovery actions, more than 200 Gila topminnow reintroductions or natural dispersals from reintroductions have occurred at 175 wild locations. For this count, a wild location refers to an area that does not have a mailing address, in contrast with a captive population that does (following Simons 1987). Eighteen wild populations remained in 1997, 17 of which are in historic range (Weedman and Young 1997). Seven of these populations are secure enough that they should persist into the foreseeable future. Minckley and Brooks (1985), Brooks (1985, 1986), Simons (1987), Bagley et al. (1991), Brown and Abarca (1992), and Weedman and Young (1997) describe the plight of re-established and captive populations of Gila topminnows.

Gila topminnows also have been stocked into many captive locations for propagation or conservation. Twelve captive populations were known to persist in 1997. The following publicly maintained populations are large enough to provide individuals for reintroductions, although one is known to be mixed with topminnows from more than one natural population (Arizona-Sonora Desert Museum, Boyce-Thompson Arboretum (mixed), Dexter National Fish Hatchery and Technology Center, Roper Lake State Park, Arizona State University, and Hassayampa River Preserve).

2.9e Environmental Baseline

Gila topminnow currently occupy the Santa Cruz River in its perennial reaches, as far north as Chavez Siding Road. This reach of the river was also occupied by longfin dace (*Agosia chrysogaster*), desert sucker (*Catostomus clarki*), Sonora sucker (*Catostomus insignis*), green sunfish (*Lepomis cyanellus*), and mosquitofish as recently as 1997 (USFWS 2001d). No Gila topminnows occur on the Tumacacori EMA and there are currently no plans for reintroductions in any locations (CNF 2000; D. Duncan, USFWS, pers. comm., 1 October 2002).

2.9f Effects of Proposed Action on the Gila topminnow

Direct Effects

The effects of the proposed action on this species are not anticipated to include direct effects to individual Gila topminnow because no construction will occur within occupied habitat.

Indirect Effects

Habitat Modification

Some indirect impacts to Gila topminnow habitat from erosion are possible from the construction of the proposed action. While the removal of vegetation for construction of access roads will increase surface runoff and sediment transport, and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997), the implementation of BMPs will help control erosion. However, unusually large precipitation events may temporarily overwhelm BMPs and result in some increase in sediment transport. Nevertheless, the distance of the proposed action from the Santa Cruz River will minimize the amount of sediments reaching Gila topminnow habitat.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Roads constructed for the proposed action also may allow the establishment or increased density of non-native grasses, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Wildfires could remove groundcover that is important in dissipating rainfall energy and reducing erosion.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action. Measures outlined in the Invasive Species Management Plan also will minimize the introduction or spread of invasive species that may facilitate fires.

2.9g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species encompasses private, state, and federal land, the habitat with the

highest potential for occupancy by Gila topminnow occurs on private land in Santa Cruz County. Most future actions on private land will not be subject to Section 7 consultation.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand for recreational use of USFS lands.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.9h Effects Determination and Incidental Take

The transport of sediments into the Santa Cruz River may affect the Gila topminnow; however, any increase in sediments will be relatively small because of the distance of the proposed action from occupied habitat. Therefore, it is not likely to adversely affect the species.

Because the proposed action is not likely to adversely affect the species, no take of Gila topminnow is anticipated.

2.10 MEXICAN GRAY WOLF (*Canis lupus baileyi*) (Endangered)

2.10a. Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential habitat for Mexican gray wolf is found within portions of Santa Cruz County containing oak and pine/juniper savannas above 4,000 ft (1,200 m). Wolves may travel long distances during hunting expeditions, typically in an irregular circle 20 mi (34 km) to 60 mi (68 km) in diameter. The action area for the Mexican gray wolf considered for the proposed action includes all potential habitat and travel corridors in western Santa Cruz and southern Pima County.

2.10b. Natural History and Distribution

Mexican gray wolves (Figure 21) are the smallest and southernmost of the 5 subspecies of gray wolf in North America. The Mexican gray wolf is a large dog-like carnivore with a mixed brown, rust, black, gray, and white. This species has a distinct white lip line, chin, and throat. Adults weigh between 50-90 lbs (23-41 kg) (Hoffmeister 1986). The historic range was from southeastern Arizona, southwestern New Mexico, southwestern Texas, and south through the Sierra Madre of Mexico. The Mexican gray wolf is the southernmost occurring and most endangered subspecies in North America. This wolf is the last subspecies of gray wolf known to occur in the Arizona-New Mexico area. The last known naturally occurring specimen in the United States was found in New Mexico in 1970 (USFWS 2001d).

Figure 21. Mexican gray wolf.

Historically, Mexican gray wolf habitat was montane woodlands, presumably because of the favorable combination of cover, water, and prey availability. Most wolf collections came from pine, oak, and pinyon-juniper woodlands, and intervening or adjacent grasslands above 1,372 m (4,500 ft) (Brown 1983b). Wolves avoided desertscrub and semidesert grasslands, but wooded riparian corridors were probably used for travelling and hunting (Parsons 1996).

These are social animals in the dog family that live and travel in packs of 7 to 30 animals depending upon prey size and availability. Mexican gray wolves prey upon a variety of animals from mice and squirrels to deer and elk. Territory size can range from 30 (78 km^2) to 500 mi^2 (1,295 km^2) or more. Packs are led by a pair of dominant animals that control most of the breeding. Breeding season lasts from late winter to early spring, and the dominant female produces up to 6 pups for the pack. The wolves care for the pups communally.

During the late 1800s through the mid 1900s, extensive hunting, trapping, and poisoning efforts at local, state, and federal levels resulted in the extirpation of this species from the United States portion of its range. Reintroduction efforts of captive bred wolves are under way in the Blue Range Recovery Area of eastern Arizona and New Mexico. Fourteen packs have been released to date.

2.10c Critical Habitat

No critical habitat has been designated for this species.

2.10d Current Status Statewide

Mexican gray wolves were listed as endangered by the USFWS in 1976 (41 FR 17736) without critical habitat. In 1998, an experimental, non-essential population was designated for the southwest (63 FR 1763) and a reintroduction program was initiated. Eleven wolves from captive breed stock were reintroduced into the Apache National Forest in southeastern Arizona under the experimental, non-essential designation in an effort to re-establish the subspecies to a portion of its historic range. A Recovery Plan for this subspecies was completed in 1982 and revisions are currently in progress (USFWS 2001d).

Mexican gray wolf populations steadily declined in Arizona because of predator control programs and conflicts with livestock interests. Pressure to control wolves became a priority beginning in the 1920s when this subspecies was nearly eliminated from the state and prevention of wolves from entering from Mexico was undertaken. In 1921 and 1922, a reported 58 wolves were taken by trapping or poisoning in Arizona. By 1924, reported takings dropped to 29 and by 1936, to 5. After 1952, only 2 wolves were reported taken in Arizona, 1 in 1958 and another in 1960 (Hoffmeister 1986). Reports of Mexican gray wolves living in the wild in Arizona continued into the early 1970s (USFWS 1982).

Similar predator control programs in Mexico reduced populations and may have eliminated the wolf by the 1980s. Surveys conducted in Mexico in the early 1990s did not confirm Mexican gray wolf populations in the wild (Parsons 1996).

2.10e Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem within the action area. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consideration.

The Tumacacori EMA contains some areas of montane and riparian woodlands that may serve as dispersal corridors for Mexican gray wolves. If wolf populations exist in the mountains of Sonora, these corridors may be used as hunting and dispersal corridors. There are currently no plans to reintroduce the Mexican gray wolf into southern Arizona and, because of the distance and fragmentation of intervening habitat, it is unlikely that current experimental populations in northern Arizona could disperse into Santa Cruz County.

2.10f Effects of Proposed Action on the Mexican Gray Wolf

Direct Effects

Construction Noise and Activity

Because the only wild populations of Mexican gray wolves in Arizona occur in the Apache National Forest, disturbance from construction of the proposed action, even in suitable dispersal habitat, is highly unlikely. In the event that populations of wolves exist in Mexico and could disperse into southern Arizona, the greatest likelihood of disturbance will result from the use of helicopters during early morning or late evening hours. However, because of the linear nature of the proposed action, any noise or construction disturbance will be widely distributed and relatively minor in any single area.

Indirect Effects

Habitat Modification and Fragmentation

Roads can reduce habitat value because of habitat fragmentation and edge effects. Gray wolves (*Canis lupus*) in Wisconsin are limited to places with pack-area mean road densities of 0.7 mi/1 mi^2 (1.1 km/1 km^2) or less (Mladenoff et al. 1995). Some studies have shown that a few large areas of low road density, even in a landscape of high average road density, may be the best indicator of suitable habitat for large vertebrates (Rudis 1995). Access and construction roads for the proposed action commonly are spurs from existing roads and range between 500 ft (152 m) and 1,000 ft (305 m) in length, which do not isolate or separate habitat patches. Furthermore, construction activities within montane woodlands, riparian corridors or major canyons will be minimal and widely distributed, resulting in negligible impacts to the composition or structure of Mexican gray wolf habitat.

Increased Legal and Unauthorized Access to Mexican Gray Wolf Habitat

Gray wolves experience negative interactions with humans and roads are a key facilitator (Thiel 1985). Increased human access to potential wolf habitat through the use of temporary proposed construction roads could reduce the quality of the habitat and human interactions may increase mortality (Mech 1973). The road closure techniques outlined in the SECTION 1.4 and the RA (URS 2003) will minimize unintended uses of these roads.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, wolves will not likely be directly impacted by wildfires; however, these wildfires could potentially alter or destroy portions of prey species habitat. While the short-term effects of wildfires may affect prey species through loss of forage from the fire, increased herbaceous production in the years following a fire may improve habitat in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining suppression strategies were used, both in firefighter access and because roads were

widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape. Fire prevention measures outlined in the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.10g Cumulative Effects
Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species encompasses private, state, and federal lands, the habitat with the highest potential for occupancy by Mexican gray wolf occurs on USFS land in Santa Cruz County. Future federal actions will be subject to Section 7 consultation and will not be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand for recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area and results in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.10h Effects Determination and Incidental Take
Construction noise and activity associated with the proposed action may affect the Mexican gray wolf, but it is not likely to adversely affect the species because any disturbance will be widely distributed and short term in duration.

Because the proposed action is not likely to adversely affect the Mexican gray wolf, no take is anticipated.

3.0 USFS SENSITIVE SPECIES

USFS special status species are plant and wildlife species that are of concern because their populations are declining in size. In a letter dated 25 April 2002, AGFD listed 40 USFS Sensitive species that are known to occur in the vicinity of the proposed corridor or may be expected to occur along the corridor if suitable habitat exists. The information listed in the letter was based on AGFD Heritage Data Management System. AGFD species abstracts and other literature also were reviewed for species' historical ranges and habitat preferences. While field reconnaissance surveys were conducted along the entire corridor, species-specific surveys were impractical because of ongoing drought conditions in the project area, therefore the potential presence of sensitive species was assumed in all areas containing potential habitat. The 40 USFS Sensitive species that may occur on or near the proposed Western Corridor are listed in Table 3.

TABLE 3. SUMMARY OF EFFECTS ON U. S. FOREST SERVICE SENSITIVE SPECIES.		
COMMON NAME ***Scientific Name***	**EFFECTS DETERMINATION**	**JUSTIFICATION**
Alamos Deer Vetch *Lotus alamosanus*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Arid Throne Fleabane *Erigeron arisolis*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Arizona Giant Sedge *Carex ultra*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Arizona Metalmark *Calephelis rawsoni arizonensis*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona. • Mitigation plantings of host species will reduce impacts.
American Peregrine Falcon *Falco peregrinus anatum*	No Impacts	• Seasonal restriction will prevent disturbance to species within project area.
Bartram's Stonecrop *Graptopetalum bartramii*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Beardless Chinch Weed *Pectis imberbis*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona. • Species is adapted to disturbances.

TABLE 3 (CONTINUED). SUMMARY OF EFFECTS ON U. S. FOREST SERVICE SENSITIVE SPECIES.		
COMMON NAME ***Scientific Name***	**EFFECTS DETERMINATION**	**JUSTIFICATION**
Catalina Beardtongue *Penstemon discolor*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Cave Myotis *Myotis velifer*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• No known roosts within project area. • Only small percentage of foraging habitat within project area may be impacted. • Populations of this species occur throughout southern Arizona.
Chiltepine *Capsicum annuum* var.*glabriusculum*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Chihuahuan Sedge *Carex chihuahuensis*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Chiricahua Mountain Brookweed *Samolus vagans*	No Impacts.	• No construction in perennial aquatic habitats.
Five-Stripped Sparrow *Aimophila quinquestriata*	No Impacts.	• Potential habitat and know occurrences are outside project area.
Foetid Passionflower *Passiflora foetida*	No Impacts.	• Known populations occur outside project area.
Gentry Indigo Bush *Dalea tentaculoides*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Giant Spotted Whiptail *Cnemidophorus burti strictogrammus*	No Impacts.	• Known populations occur outside project area.

TABLE 3 (CONTINUED). SUMMARY OF EFFECTS ON U. S. FOREST SERVICE SENSITIVE SPECIES.		
COMMON NAME ***Scientific Name***	**EFFECTS DETERMINATION**	**JUSTIFICATION**
Large-Flowered Blue Star *Amsonia grandiflora*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Lowland Leopard Frog *Rana yavapaiensis*	No Impacts.	• Known populations occur outside project area. • No construction in perennial aquatic habitats.
Lumholtz Nightshade *Solanum lumholtzianum*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Mexican Garter Snake *Thamnophis eques megalops*	No Impacts.	• No construction in perennial aquatic habitats. • Minimal impacts to riparian habitat.
Mock-Pennyroyal *Hedeoma dentatum*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Nodding Blue-eyed Grass *Sisyrinchium cernuum*	No Impacts.	• Known populations occur outside project area.
Northern Gray Hawk *Asturina nitida maxima*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Mitigation of riparian vegetation. • Populations within Arizona appear stable.
Santa Cruz Beehive Cactus *Coryphantha recurvata*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Santa Cruz Star Leaf *Choisya mollis*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Santa Cruz Striped Agave *Agave parviflora* ssp. *parviflora*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Plants occur throughout Nogales Ranger District. • Mitigation plantings of agave will reduce impacts.

TABLE 3 (CONTINUED). SUMMARY OF EFFECTS ON U. S. FOREST SERVICE SENSITIVE SPECIES.		
COMMON NAME *Scientific Name*	**EFFECTS DETERMINATION**	**JUSTIFICATION**
Seeman Groundsel *Senecio carlomasonii*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Sonoran Noseburn *Tragia laciniata*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Southern Pocket Gopher *Thomomys umbrinus intermedius*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Superb Beardtongue *Penstemon superbus*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Supine Bean *Macroptilium supinum*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Pre-construction surveys will be conducted and, if necessary, mitigation measures will be coordinated with USFS personnel.
Sweet Acacia *Acacia smallii*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Thurber Hoary Pea *Tephrosia thurberi*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Thurber's Morning-glory *Ipomoea thurberi*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Virlet Paspalum *Paspalum virletti*	No Impacts.	• Known populations occur outside project area.

TABLE 3 (CONTINUED). SUMMARY OF EFFECTS ON U. S. FOREST SERVICE SENSITIVE SPECIES.		
COMMON NAME ***Scientific Name***	**EFFECTS DETERMINATION**	**JUSTIFICATION**
Weeping Muhly *Muhlenbergia xerophila*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Western Barking Frog *Eleutherodactylus augusti cactorum*	No Impacts.	• Known populations occur outside project area.
Western Yellow-billed Cuckoo *Coccyzus americanus*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Wiggins Milkweed Vine *Metastelma mexicanum*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Populations within Arizona appear stable. • Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Wooly Fleabane *Laennecia eriophylla*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.

3.1 PLANTS

Alamos deer vetch (*Lotus alamosanus*)
Alamos deer vetch is a perennial herb found in southern Arizona, and Sonora, Chihuahua, and Durango, Mexico. Within Arizona, this plant is found in Sycamore Canyon and the Pajarito Mountains of Santa Cruz County, and near Garden Valley in Maricopa County. This plant is considered a wetland obligate species that is restricted to stream banks in canyons at elevations ranging from 3,500 ft (1,067 m) to 5,500 ft (1,676 m) (AGFD 1999a). Within the Nogales RD, this plant occurs in the Sycamore Canyon and Peña Blanca Canyon areas (T. Newman, CNF, pers. comm., 20 August 2002).

Population trends for Alamos deer vetch are unknown (AGFD 1999a). The proposed transmission line may cross potential Alamos deer vetch habitat; however, construction within riparian habitats will be minimized to the greatest extent possible. Furthermore, viable populations occur outside of the project area, including the Gooding RNA. There may be an impact to individual plants during development of the line; however, disturbance will be limited to a few individuals and is not likely to result in a trend toward federal listing or loss of viability.

Arid throne fleabane (*Erigeron arisolis*)
Arid throne fleabane is an annual to short-lived perennial forb that occurs in Arizona, southwestern New Mexico and Sonora, Mexico. Within Arizona, this plant is found in Apache, Cochise, Pima, and Santa Cruz counties. This species is typically found on moist rocky soils in grasslands, grassy openings within oak woodlands, and roadsides at elevations between 4,200 ft (1,280 m) and 5,500 ft (1,676 m) (AGFD 2000a). On the CNF Nogales RD, it has been documented from Box Canyon and Ruby Roads (T. Newman, CNF, pers. comm., 20 August 2002).

Arid throne fleabane favors moist areas in grasslands and grassy openings in oak woodlands, areas also favored by livestock for grazing (AGFD 2000a). The proposed transmission line parallels Ruby Road, a known location for this species. Placement of the transmission line may impact individual arid throne fleabane, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Arizona giant sedge (*Carex ultra*)
Arizona giant sedge is the largest sedge found in Arizona. Its range includes southeast Arizona, extreme southwest New Mexico (Hidalgo County, Indian Springs in the Pelocillos) and Mexico (Sonora and Coahila). Within Arizona, this sedge is found in Cochise, Graham, Pinal, Yavapai, Pima (Santa Rita Mountains and the Rincon Valley), and Santa Cruz counties (Santa Rita and Atascosa mountains). Typically only 1 patch per mountain has been found. Like other sedges, this plant is associated with moist soil

near perennial wet springs and streams and undulating rocky-gravelly terrain at elevations ranging from 2,040 ft (622 m) to 6,000 ft (1,829 m) (AGFD 2000b). Within the Nogales RD, Arizona giant sedge is found in Sycamore Canyon and Mule Ridge in the Atascosa Mountains, and at Deering Spring and Big Casa Blanca Canyon in the Santa Rita Mountains (T. Newman, CNF, pers. comm., 20 August 2002).

Small populations of this sedge are vulnerable to local disturbance of aquatic or riparian habitat (AGFD 2000b). The proposed transmission line may cross potential Arizona giant sedge habitat; however, no construction will occur in perennial aquatic habitats and construction within riparian habitats will be minimized to the greatest extent possible. There may be an impact to individual plants during development of the line; however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Bartram's stonecrop (*Graptopetalum bartramii*)
Bartram's stonecrop is a small succulent perennial found in southern Arizona and Chihuahua, Mexico (one record). In Arizona, this plant occurs in Santa Cruz County within the Patagonia, Santa Rita, and Tumacacori Mountains, in Pima County within the Baboquivari, Dragoon, and Rincon mountains, and in Cochise County within the Chiricahua Mountains. Habitat for Bartram's stonecrop consists of cracks in rocky outcrops within shrub live oak-grassland communities located on the sides of rugged canyons. This plant is usually found in heavy litter cover and shade where moisture drips from rocks at elevations ranging from 3,900 ft (1,189 m) to 6,700 ft (2,042 m) (AGFD 1997a). Bartram's stonecrop plants are found on the west side of the Nogales RD in Tres Amigos Gulch; Sycamore, Peña Blanca, Alamo, and Peñasco canyons; in the vicinity of Montana Peak and Peña Blanca Lake (T. Newman, CNF, pers. comm., 20 August 2002).

Bartram's stonecrop populations are typically small and isolated. Illegal collection of the plant is the main management issue at this time. Other factors that may affect populations include mining and mineral exploration, habitat alteration due to livestock grazing, trampling by cattle and recreationists, and road construction and maintenance. The proposed transmission line crosses over known Bartram's stonecrop populations within the Nogales RD. Placement of the transmission line may impact individual Bartram's stonecrop, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to Bartram's stonecrop are not likely to result in a trend toward federal listing or loss of viability.

Beardless chinch weed (*Pectis imberbis*)
Beardless chinch weed is a perennial herb that is found in southern Arizona, western Chihuahua and eastern Sonora, Mexico. Within Arizona, this plant can be found in Cochise, Pima, and Santa Cruz counties (within Santa Cruz County it is found along Ruby Road in the Atascosa Mountains and in the Red Rock area of Canelo Hills). Habitat for this species consists of open areas in grassland and oak-grassland

communities. Beardless chinch weed has an extremely broad habitat range and can be found at elevations from 4,000 ft (1,219 m) to 5,000 ft (1,524 m) (AGFD 1998a).

Populations of beardless chinch weed may be susceptible to impacts from grazing and road maintenance activities but the species is adapted to disturbances and grows along road cuts (AGFD 1998a). The proposed transmission line crosses over known beardless chinch weed populations within the Nogales RD. Placement of the transmission line may impact individual beardless chinch weed, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to beardless chinch weed are not likely to result in a trend toward federal listing or loss of viability.

Catalina beardtongue (*Penstemon discolor*)
Catalina beardtongue is a perennial herbaceous sub-shrub found in southern Arizona. This shrub is found in Cochise, Graham, Pinal, Pima (within the Santa Catalina Mountains), and Santa Cruz counties (within the Atascosa and Tumacacori mountains). Habitat for Catalina beardtongue consists of bare rock outcrops, barren soil outcrops, and bedrock openings in chapparal or pine-oak woodlands at elevations ranging from 4,120 ft (1,256 m) to 7,600 ft (2,316) (AGFD 1999b). On the Nogales RD, this shrub occurs in the upper end of Peck Canyon, Corral Nuevo, and the adjacent Bartalo Mountain (Cedar Canyon), typically on whitish volcanic ash (T. Newman, CNF, pers. comm., 20 August 2002).

Rock climbers threaten some populations of this plant but few other threats exist (AGFD 1999b). The proposed transmission line crosses over known Catalina beardtongue populations within the Nogales RD. Placement of the transmission line may impact individual Catalina beardtongue, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to Catalina beardtongue are not likely to result in a trend toward federal listing or loss of viability.

Chiltepine (*Capsicum annuum* var.*glabriusculum*)
Chiltepine is an herbaceous to woody perennial shrub that is found in south Texas, southern New Mexico, southern Arizona, and south to tropical America. Within Arizona, a few populations of this plant are found in the Chiricahua, Tumacacori, Baboquivari, and Ajo Mountains. This plant occurs in protected, frost-free canyons in oak woodlands of slopes at less than 4,500 ft (1,372 m) elevation (typically found at elevations ranging from 3,600 ft [1,097 m] to 4,400 ft [1,341 m]). Chiltepine plants grow under nurse shrubs and usually are associated with rock ledges and outcrops. Within the Nogales RD, there are populations in the Tumacacori Mountains and Cobre Ridge area, and there are suspected populations on the west side of the RD (AGFD 1991a; T. Newman, CNF, pers. comm., 20 August 2002).

This plant is declining in some areas because of drought, overgrazing, and local over-collection of berries (AGFD 1991a). Placement of the transmission line may impact individual chiltepine plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to chiltepine are not likely to result in a trend toward federal listing or loss of viability.

Chihuahuan sedge (*Carex chihuahuensis*)
Chihuahuan sedge is a grass-like perennial plant that occurs in southeastern Arizona, New Mexico (Hidalgo County), and Mexico (Sonora and Chihuahua). Within Arizona, this plant ranges from Cochise, Graham, Gila, Pima (Santa Catalina, San Luis, and Rincon mountains), and Santa Cruz counties (Atascosa and Santa Rita mountains, and the Santa Cruz River). Chihuahuan sedge can be found in wet soils along streambeds and in shallower draws of pine-oak forests and riparian woodlands. It also is found in wet meadows, cienegas, marshy areas, and canyon bottoms from 1,100 ft (335 m) to 8,000 ft) (AGFD 1999c). Within the Nogales RD, this plant has been found near Arivaca Lake (on private land), Sycamore Canyon, and south of Bear Valley (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement on the population status of Chihuahuan sedge (AGFD 1999c). The proposed transmission line may cross potential Chihuahuan sedge habitat; however, construction within riparian habitats will be minimized to the greatest extent possible. There may be an impact to individual plants during development of the line; however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Chiricahua Mountain brookweed (*Samolus vagans*)
Chiricahua Mountain brookweed is a perennial herb found in southeastern Arizona, western Chihuahua, and eastern Sonora, Mexico. This plant apparently reaches its southern limit in southern Sonora, Mexico. Within Arizona, this species is found in the Huachuca Mountains of Cochise County, the Rincon, Santa Catalina, and Santa Rita mountains of Pima County, and the Canelo Hills and Pajarito mountains of Santa Cruz County. The Chiricahua Mountain brookweed is confined to areas with permanent water, such as springs, seeps, and in and along streams at elevations ranging from 1,219 to 2,195 m (4,000 – 7,200 ft) (AGFD 1999d). Within the Nogales RD, this plant occurs in Florida Canyon of the Santa Rita Mountains and in Sycamore Canyon of the Atascosa Mountains (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of Chiricahua Mountain brookweed (AGFD 1999d). Because no construction will occur within perennial aquatic habitats, the proposed action will have no effect on the population status of the Chiricahua Mountain brookweed.

Foetid passionflower (*Passiflora foetida*)
The foetid passionflower is a herbaceous vine found in southeastern Texas and the Rio Grande Valley, southern Arizona, and southward throughout Mexico, Central and South America, and the West Indies. Within Arizona, this species is found in the Baboquivari Mountains, Arivaca, and Las Guijas Mountains of Pima County and in California Gulch and the Bartlett Mountains of Santa Cruz County. In Arizona, this plant occurs on hillsides and canyons of the Lower Sonoran zone from 1,067 to 1,707 m (3,500 – 5,600 ft) in elevation (AGFD 2000c). Within the Nogales RD, foetid passionflowers have been recorded in the California Gulch and Holden Canyon areas (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of foetid passionflower (AGFD 2000c). Because the known populations of this plant occur outside of the proposed TEP transmission line corridor, there will be no effect on the population status of the foetid passionflower.

Gentry indigo bush (*Dalea tentaculoides*)
The Gentry indigo bush is an herbaceous perennial shrub found primarily in southern Arizona, but its range may extend into Mexico. Within Arizona, this shrub is found in the Sycamore Canyon drainage of the Atascosa Mountains, in the Pajarito Mountains of Santa Cruz County, and within the Baboquivari Mountains (1930s record) and Mendoza Canyon (1965 record) of Pima County. Gentry indigo bush is typically found along canyon bottoms on cobble terraces subject to occasional flooding and seems to prefer disturbance-prone environments at elevations ranging from 1,097 to 1,341 m (3,600 – 4,400 ft) (AGFD 1998b). Historic collection records indicate that this plant may grow on rocky hillsides. Within the Nogales RD, this plant has been recorded in Sycamore Canyon, in the vicinity of Peñasco Canyon, Kaiser Canyon, and north of Manzanita Mountain (T. Newman, CNF, pers. comm., 20 August 2002).

Potential threats to Gentry indigo bush populations are cattle grazing, recreational foot traffic, and flooding events that eliminate terraces occupied by this species (AGFD 1998b). The proposed TEP transmission line will be placed to minimize disturbance to canyon bottom areas and minimal construction activity (structure placement, line stringing, and vehicle use) will occur within these areas. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Large-flowered blue star (*Amsonia grandiflora*)
The large-flowered blue star is an herbaceous perennial that is found in northern Sonora and Durango, Mexico, and southern Arizona. Within Arizona, this plant is found in the Patagonia, Atascosa/Pajarito mountains of Santa Cruz and Pima counties. Habitat for this species consists of canyon bottoms in oak woodlands typically dominated by Emory oak and Mexican blue oak; however, site-specific qualities are inconsistent. Large-flowered blue star plants have adapted to rock fall disturbance and are typically found at elevations

ranging from 1,189 to 1,372 m (3,900 4,500 ft) (AGFD 1998c). Within the west side of the Nogales RD, this plant occurs at Peña Blanca and Arivaca Lakes, Sycamore Canyon, Chiminea Canyon, California Gulch, and near Ruby (T. Newman, CNF, pers. comm., 20 August 2002).

Populations of large-flowered blue star are rare, with only 15 to 20 populations within 2 mountain ranges as the total world distribution, but populations seem to be stable. This plant is highly susceptible to disturbance, and expanding development in the Nogales area (AGFD 1998c) may impact populations. The proposed TEP transmission line crosses near a known large-flowered blue star population in Peña Blanca Canyon, and some individual plants, comprising a small percentage of the total population, may be impacted. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Lumholtz nightshade (*Solanum lumholtzianum*)
The Lumholtz nightshade is an herbaceous annual that is found in southern Arizona and northern Mexico. Within Arizona, this plant is found in the Arivaca and San Luis Mountains of Pima County and the Patagonia, Atascosa, and Santa Rita Mountains of Santa Cruz County. Lumholtz nightshade plants are typically found in washes and low ground near wet depressions and along stream banks from 914 to 1,402 m (3,000 – 4,600 ft) elevation in desert grassland plant communities. This plant is also often found in disturbed, weedy areas (AGFD 2000d). Within the Nogales RD, this nightshade is found in the vicinity of Arivaca, Ruby, California Gulch, Nogales, Cobre Ridge, and Oro Blanco Wash (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of Lumholtz nightshade (AGFD 2000d). The proposed transmission line may cross potential habitat for this species; however, construction within riparian habitats will be minimized to the greatest extent possible. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Mock-pennyroyal (*Hedeoma dentatum*)
The mock-pennyroyal is an herbaceous perennial plant found in southeastern Arizona and northern Sonora, Mexico. Within Arizona, this plant is found in the Chiricahua, Huachuca, Mule, Whetstone, and Winchester mountains of Cochise County, the Pinaleno Mountains of Graham County, the Baboquivari, Rincon, and Santa Cruz mountains of Pima County, and the Atascosa, Mustang, Pajarito, and Santa Rita mountains of Santa Cruz County. Habitat for this plant consists of oak woodland, oak-pine forest, and pine forest. It can be found on open roadcuts, steep rocky outcrops, and gravelly slopes in wooded canyons with open to full sunlight at elevations ranging from 1,173 to 2,500 m (3,850 – 8,200 ft) (AGFD 2000e).

Populations of mock-pennyroyal seem to be restricted to a relatively small geographic area, and populations are apparently small. Because habitat for this species is widespread, placement of the transmission line may impact individual plants. However because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Nodding blue-eyed grass *(Sisyrinchium cernuum*)
Nodding blue-eyed grass is a perennial forb with grass-like leaves that occurs in southeastern Arizona, west Texas, and Mexico. Within Pima and Santa Cruz counties, Arizona it occurs in the Pajarito, Santa Rita, Atascosa, and Rincon mountains as well as Sycamore Canyon. This species can be found in desert grassland and pine-oak woodlands from 1,006 to 2,438 m (3,300 – 8,000 ft) in elevation along streams in partial shade and in canyon bottoms. It grows in wet soil by seeps, pools, or springs in desert scrub. It has also been found on sandy stream banks. On the Nogales RD, this plant has been found at 1,189 m (3,900 ft) in Sycamore Canyon on the west side and at 1,402 m (4,600 ft) in Big Casa Blanca Canyon in the Santa Rita Mountains (AGFD 1999e). The known location of this plant in Sycamore Canyon is within the Goodding RNA, located approximately 1.6 km (1 mi) west of the proposed ROW (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of nodding blue-eyed grass (AGFD 1999e). However, this species is not likely to be affected by the proposed placement of a transmission line within the Nogales RD. The proposed transmission line will not cross over or near known locations of this plant within the Goodding RNA. Therefore, placement of the TEP transmission line from Sahuarita to Nogales will have no impact on the nodding blue-eyed grass.

Santa Cruz beehive cactus (*Coryphantha recurvata*)
The Santa Cruz beehive cactus is a succulent perennial that occurs in southern Arizona and northern Sonora (about 20 km [12.4 mi] south of the international border), Mexico. Within Arizona, this species occurs in western Santa Cruz County from Nogales and the Tumacacori Mountains west to the Atascosa/Pajarito mountains. Santa Cruz beehive cacti are found in alluvial soils of valleys and foothills in grassland and oak woodland habitats from 1,219 to 1,829 m (4,000 – 6,000 ft). These plants are either on rocky hillsides with high grass cover or in rock crevices where runoff accumulates and provides a more favorable moisture relationship than the surrounding soils (AGFD 1998d). Within the Nogales RD known plant locations have increased since 1997 (813 plant clumps in 1997, 807 plant clumps in 1998, and 175 in 1999) (T. Newman, CNF, pers. comm., 20 August 2002).

Accessible populations of the Santa Cruz beehive cactus have declined due to collection, but the status of populations beyond accessible areas is unknown (AGFD 1998d). The proposed TEP transmission line crosses over several known Santa Cruz beehive cactus

populations within the Nogales RD. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Santa Cruz star leaf (*Choisya mollis*)
The Santa Cruz star leaf is a perennial shrub that occurs in southern Arizona within the Atascosa, Pajarito, and Tumacacori mountains of Santa Cruz County. Santa Cruz star leaf plants are found primarily within madrean evergreen woodland communities from 1,067 to 1,524 m (3,500 – 5,000 ft) in elevation. This plant is usually found in canyon bottoms and slopes, usually in the shade of oaks and other trees, or rock outcrops (AGFD 1999f). Santa Cruz star leaf plants have been found throughout the eastern portion of the Nogales RD (T. Newman, CNF, pers. comm., 20 August 2002).

Santa Cruz star leaf are typically found in rugged and remote mountainous areas where human activity is low and the likelihood of disturbance or removal of plants is minimal. However, the species population trend is unknown and existing populations are relatively rare, have a restricted range, and are only found within specific habitats (AGFD 1999f). The proposed TEP transmission line will cross areas with known populations of Santa Cruz star leaf. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Santa Cruz striped agave (*Agave parviflora* ssp. *parviflora*)
Santa Cruz striped agave is a small perennial succulent found in southern Arizona and northern Mexico. Within Arizona, this species is found near Arivaca in Pima County, and in the Las Guijas, Pajarito, Patagonia, Santa Rita, and Atascosa mountains of Santa Cruz County. Habitat for this agave consists of rocky or gravelly slopes of middle elevation mountains, in desert grassland or oak woodlands. This plant appears to prefer soils on rounded ridge-tops where grasses and shrubs are sparse and soil is bare or nearly so (AGFD 1998e). Santa Cruz striped agave have been found throughout the Nogales RD (primarily within the Atascosa, Pajarito, San Luis, and Las Guijas mountains), and in recent years the documented number of individual plants and number of locations has increased for this area (T. Newman, CNF, pers. comm., 20 August 2002).

Some populations of Santa Cruz striped agave have declined due to illegal collection and loss of habitat due to mining and road construction. Livestock grazing has caused degradation of habitat and browsing of flower stalks (AGFD 1998e). The proposed TEP transmission line crosses areas with known populations of Santa Cruz striped agave and there may be an impact to individual plants during development of the line. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area and

transplanting of agave plants in project area will minimize impacts. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Seeman groundsel (*Senecio carlomasonii*)
The seeman groundsel is a perennial herb or subshrub found in southern Arizona and Mexico (Sonora, Chihuahua, Nayarit). Within Arizona, this plant is found in the Chiricahua and Huachuca mountains of Cochise County, the Baboquivari and Santa Rita mountains of Pima County, and the Santa Rita, Pajarito, and Peña Blanca mountains of Santa Cruz County (AGFD 2000f). Within the Nogales RD, seeman groundsel have been recorded in the Peña Blanca Lake and Sycamore Canyon areas (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of seeman groundsel (AGFD 2000f). A potential threat to seeman groundsel habitat may be trampling by hikers. Placement of the proposed transmission line may impact individual plants. However because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Sonoran noseburn (*Tragia laciniata*)
Sonoran noseburn is an herbaceous perennial that occurs in southern Arizona, Mexico (Sonora and Chihuahua), and possibly New Mexico. Within Arizona this plant can be found in Cochise County in the Huachuca Mountains and Canelo Hills, in Pima County in the Santa Rita Mountains, and in Santa Cruz County in the Atascosa Mountains (Sycamore Canyon), Patagonia Mountains, Pajarito Mountains, Canelo Hills (O'Donnell Canyon), and Santa Rita Mountains. Sonoran noseburn typically occur at elevations of 1,067 to 1,722 m (3,500 – 5,650 ft) along streams and canyon bottoms, on shaded hillsides within the upper parts of the Lower Sonoran and Upper Sonoran biotic communities, and open woodland areas (AGFD 2000g). This species has been found in canyons, along streams, and near roadways of the Nogales RD (AGFD 2000g).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of Sonoran noseburn (AGFD 2000g). Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Superb beardtongue (*Penstemon superbus*)
The superb beardtongue is a perennial herbaceous forb found in southeastern Arizona, New Mexico, and Mexico (Chihuahua). Within southern Arizona, this species is found in Pima County in the Santa Catalina and Santa Rita mountains, and in Santa Cruz County within the Tumacacori Mountains. This plant is generally found in rocky canyons, dry

hillsides, and along washes in sandy or gravelly soils at elevations between 945 and 1,676 m (3,100 – 5,500 ft) (AGFD 2000h). Within the Nogales RD, it has been found in Rock Corral Canyon and Box Canyon (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of superb beardtongue (AGFD 2000h). Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Supine bean (*Macroptilium supinum*)
The supine bean is a perennial herb that grows in colonies and produces underground fruits. The total range for this species includes Santa Cruz County, Arizona, south into Mexico, including the states of Sonoran and Nayarit. Within Arizona, this plant can be found in the Atascosa/Pajarito, San Luis, and Patagonia Mountains, and the southern portion of the Santa Cruz River drainage in Santa Cruz County (much of this area is within the Nogales RD). Supine bean are typically found along ridge tops and gentle slopes of rolling hills in semi-desert grassland or grassy openings in oak-juniper woodlands at elevations between 1,097 and 1,494 m (3,600 – 4,900 ft) (AGFD 1999g).

There are currently an estimated 12 populations of this species in Arizona. Populations range from small (around 20 individuals) to relatively large (around 3,500 individuals). A 43% decline in a monitored population was recorded from 1989 to 1993. This decline was apparently due to low reproductive output and poor recruitment, although the reasons for these are unknown (AGFD 1999g). Possible threats to this species include degradation of habitat due to livestock grazing, off-road vehicle activity, recreation (camping and hiking), Border Patrol activities, utility corridor and road construction/maintenance, and home building (AGFD 1999g).

Because of the recent decline in monitored populations and drought conditions noted in 2002, additional surveys will be conducted prior to construction in potential supine bean habitat. If populations of this species are found in the vicinity of construction, consultation with USFS biologists will be initiated to minimize impacts. Development of the proposed TEP transmission line is likely to have an impact on this species. However, once additional surveys are completed, impacts are likely to be limited to individual plants and not whole populations. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Sweet acacia (*Acacia smallii*)
The sweet acacia is a woody perennial spiny shrub or small tree found in Texas, Arizona, and California south to Argentina. Within Arizona, this species is found in the Baboquivari Mountains of Pima County and Sycamore Canyon and Atascosa Mountains of Santa Cruz County. Sweet acacia are typically found in the lower slopes of canyons of

riparian areas in desert grassland communities from elevations ranging from 1,067 to 1,219 m (3,500 – 4,000 ft) (AGFD 1992).

Population trends for the sweet acacia are unknown (AGFD 1992). The proposed TEP transmission line may cross potential sweet acacia habitat; however, construction within riparian habitats will be minimized to the greatest extent possible. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Thurber hoary pea (*Tephrosia thurberi*)
The Thurber hoary pea is a perennial shrub that occurs in southern Arizona and Mexico (northern Sonora and southwestern Chihuahua). Within Arizona, this plant can be found in Cochise, Santa Cruz, and Pima counties. On the Nogales RD, Thurber hoary pea plants are found in the Santa Rita and Atascosa mountains. This species typically occurs on rocky slopes among oaks, pines, junipers, manzanitas, open hilltops, and grasslands at elevations between 1,067 and 2,134 m (3,500 – 7,000 ft) (AGFD 1999h).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of Thurber hoary pea (AGFD 1999h). Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Thurber's morning-glory (*Ipomoea thurberi*)
Thurber's morning-glory are perennial herbaceous vines that are found in southern Arizona and Mexico (Chihuahua and Sonora). Within Arizona, this plant is found in the Huachuca and Mule Mountains of Cochise County, the Santa Rita Mountains of Pima County, and in the vicinity of Nogales, the Canelo Hills, and the Patagonia and Atascosa/Pajarito mountains of Santa Cruz County. Habitat in Arizona typically consists of rocky hillsides and canyon slopes in madrean evergreen woodland and semi-desert grassland communities in elevations between 1,158 and 1,570 m (3,800 – 5,150 ft) (AGFD 2000i). On the Nogales RD, this morning glory has been found in the vicinity of Peña Blanca Lake, east of Peñasco Canyon, and Bear Valley (T. Newman, CNF, pers. comm., 20 August 2002).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of Thurber's morning-glory (AGFD 2000i). Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated

mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Virlet paspalum (*Paspalum virletti*)
The virlet paspalum is a perennial grass found in southeastern Arizona and Mexico (Sonora and San Luis Potosi). Within Arizona, this grass is found in the Huachuca Mountains of Cochise County, and in the Pajarito Mountains and Sycamore Canyon of Santa Cruz County. This grass is found in sandy soils of canyon bottoms in semi-desert grassland communities and grassy areas within madrean evergreen woodland communities at elevations ranging from 1,067 to 1,737 m (3,500 – 5,700 ft) (AGFD 1999i). In the Nogales RD, the only known location for this grass is in Sycamore Canyon growing in a sandy canyon bottom (T. Newman, CNF, pers. comm., 20 August 2002).

This species is rare in Arizona, where it is known from only 2 widely separated populations. There is no information on the potential effects of land use activities, such as utility placement, on the population status of virlet paspalum (AGFD 1999i). Known locations of this plant occur outside of the proposed TEP transmission line corridor; therefore, placement of the line is not likely to impact the virlet paspalum.

Weeping muhly (Sycamore Canyon muhly) (*Muhlenbergia xerophila*)
Weeping muhly is a perennial herbaceous grass found only in southern Arizona. Populations occur in the Santa Catalina, Rincon, Santa Rita, Tumacacori, and Baboquivari mountains of Pima County, and in Sycamore Canyon within the Pajarito Mountains of Santa Cruz County. Weeping muhly most often grow in crevices of cliffs, bedrock, and other rocks along canyon bottoms. This grass is also known from rocky canyon slopes in oak, pine-oak, and riparian woodlands at elevations between 1,073 and 1,829 m (3,520 – 6,000 ft) (AGFD 1999j).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of weeping muhly (AGFD 1999j). Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Wiggins milkweed vine (*Metastelma mexicanum*)
Wiggins milkweed vine is a perennial herbaceous vine with a woody base found in southeastern Arizona to southern Sonora, Mexico. Within Arizona, this vine occurs around the Nogales and Ruby areas, Sycamore Canyon area, and Patagonia Mountains of Santa Cruz County, and Baboquivari, Coyote, and Catalina mountains of Pima County. This vine is typically found on open slopes within open oak woodland on granite soils of juniper flats at elevations between 1,067 and 1,554 m (3,500 – 5,100 ft) (AGFD 2000j). Wiggins milkweed vine has been found in several locations within the Nogales RD (T. Newman, CNF, pers. comm., 20 August 2002).

Populations of Wiggins milkweed vine within Arizona appear to be stable. This vine depends on surrounding vegetation for microhabitat and will be affected by any disturbance to area habitat (AGFD 2000j). Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Wooly fleabane (*Laennecia eriophylla*)
Wooly fleabane is a perennial herb found in southeastern Arizona and northern Mexico (Sonora and Chihuahua). In Arizona, wooly fleabane occurs in the Atascosa Mountains, Pajarito Mountains, Santa Rita Mountains, Canelo Hills, and in the vicinity of Sonoita Creek in Santa Cruz County. This species is typically found in gravelly soil of rocky slopes and ridges with dense grass cover in semi-desert grassland, dry oak woodland, and pine-oak woodland communities at elevations between 1,292 and 1,722 m (4,240 – 5,650 ft) (AGFD 1999k). There are known locations of wooly fleabane in the Nogales RD (T. Newman, CNF, pers. comm., 20 August 2002).

Population sizes of this plant are usually very small, with typically no more than 40 plants found in any of the populations known from Arizona. Population numbers fluctuate with the amount and timing of summer rains from year to year. This species was probably more common before its habitat was altered by excessive grazing (AGFD 1999k). Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

3.2 INVERTEBRATES

Arizona metalmark (*Calephelis rawsoni arizonensis*)
The Arizona metalmark is a small, brown butterfly with bands of blue metallic markings on the upper and underside of the body. This butterfly occurs in Arizona, and from the Animas Mountains in southwestern New Mexico southward to Sonora, Mexico. The southern limits of its range are poorly defined to date. In Arizona, this species is known from as far north as Gila County then southward through Graham, Cochise, Pima, and Santa Cruz counties in most of the mountains therein. Arizona metalmark butterflies occur mostly above the desert floor in mountain foothills. Within these mountains, it is found in riparian canyons in oak woodland or more arid regions at elevations from 716 to 1,676 m (2,350 – 5,500 ft). Canyons with standing water for a major portion of the year appear to contain populations of this species as long as *Agave* spp. are present for larvae development (AGFD 2001a). There is no information on the potential effects of land use activities, such as utility placement, on the population status of Arizona metalmark (AGFD 2001a).

Placement of the transmission line may indirectly impact individuals of this species through habitat modification, however because the species is widely distributed across southern Arizona, only a small percentage of Arizona metalmarks may be impacted. Furthermore, transplanting of agave plants also will minimize impacts. Impacts are not likely to result in a trend toward federal listing or loss of viability.

3.3 BIRDS

American peregrine falcon (*Falco peregrinus anatum*)
The American peregrine falcon subspecies is a medium-sized raptor that nests from central Alaska south to Baja California, Sonora, and the highlands of Central Mexico. Within Arizona, this raptor breeds wherever sufficient prey is available near cliffs. These raptors are rare or absent as breeders in the southwestern quarter of Arizona. Optimum habitat for peregrine falcons consists of steep, sheer cliffs overlooking woodlands, riparian areas, or other habitats supporting avian prey species in abundance. These raptors may also be found in less optimal habitat consisting of small broken cliffs in ponderosa pine forests or large sheer cliffs in very xeric areas. The presence of an open expanse is critical. American peregrine falcons can be found at elevations ranging from 122 to 2,743 m (400 – 9,000 ft) (Glinski 1998, AGFD 1998f). Peregrine falcon nests were found on Ramanote Peak and along Sycamore Canyon (CNF 2000). Both these nests are at least 1.6 km (1 mi) from the proposed ROW. In 2002, another nest was found on Castle Rock, which is within the MSO PAC and within 0.3 km (0.18 mi) of proposed structures. The seasonal restrictions in effect for MSO (SECTION 1.4) will prevent breeding season disturbance of peregrines on Castle Rock.

American peregrine falcons have been found in great numbers in Arizona as well as in areas that will have formerly been considered marginal habitat. This trend suggests that populations in Arizona may have reached levels saturating the optimal habitat available (AGFD 1998f). Placement of the proposed transmission line is not likely to disturb known nesting peregrine falcons. If new nest sites are encountered during construction, conservation measures will be developed in coordination with CNF biologists to prevent adverse effects. Development of the TEP line is not likely to result in a trend toward federal listing or loss of viability of this species.

Five-stripped sparrow (*Aimophila quinquestriata*)
The five-stripped sparrow is found in western portions of northern Sinaloa and Sonora, Mexico and the southeastern most portions of Arizona. This sparrow is primarily found in Mexico, but its range reaches into southeastern Arizona. Here, it is rarely found during breeding season, and there are only a few winter records. Five-stripped sparrow habitat is highly specialized, consisting of tall, dense shrubs on rocky, semi-desert hillsides and canyon slopes (New Mexico Game and Fish Department and the Fish and Wildlife Information Exchange 2000). Within the Nogales RD, this sparrow has been recorded within Sycamore Canyon (T. Newman, CNF, pers. comm., 20 August 2002).

Populations of five-stripped sparrow have declined because of habitat loss, fragmentation, and degradation (New Mexico Game and Fish Department and the Fish

and Wildlife Information Exchange 2000). The proposed TEP transmission line will not cross Sycamore Canyon where these sparrows have been observed. This species is not likely to be affected by the proposed placement of a transmission line within the Nogales RD.

Northern gray hawk (*Asturina nitida maxima*)
The gray hawk is a medium-sized raptor with a gray back, black tail with 2 or 3 white bands, and a finely barred gray and white chest, abdomen, and thighs (Glinski 1998). The gray hawk prefers Sonoran riparian deciduous forest and woodland plant communities and can be found along the Santa Cruz and San Pedro rivers, Sonoita Creek, and Sopori Wash. This species also has been reported from the Hassayampa and Salt rivers. This hawk species is migratory and usually arrives in Arizona in mid-March and returns south during winter months (AGFD 2000k). Gray hawks prefer cottonwood, mesquite, and hackberry woodlands with a prey base of lizards, especially the whiptail lizard *(Cnemidophorus* spp.*)*.

The current population trend for gray hawks is considered stable by the AGFD (2000k). Potential nesting habitat exists along small portions of the proposed TEP transmission line corridor along Sopori Wash. Individual gray hawks may be indirectly impacted by habitat modification from construction activity related to transmission line placement; however, construction within riparian habitats will be minimized to the greatest extent possible. Furthermore, riparian plants within Sopori Wash will be mitigated to facilitate habitat recovery. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
The western yellow-billed cuckoo is a long and slender bird with short, dark legs that nests from southern California through the northeastern United States, south through the United States to the Florida Keys, Central America and southern Baja California, Mexico. This species winters from South America to central Argentina and Uruguay. Within Arizona, western yellow-billed cuckoo are found in southern and central Arizona and the extreme northeast portion of the state. This species is typically found in streamside areas with cottonwood, willow groves, and larger mesquite bosques (AGFD 1998g). This species has been observed in Sopori Wash and Sycamore, Peck, and Peña Blanca canyons (AGFD 1998g; CNF 2000; P. Titus, T. Furgason, SWCA, pers. comm.16 October 2002).

Populations of western yellow-billed cuckoo have been reduced; a general decline is occurring in all areas with known populations (AGFD 1998g). This species is sensitive to habitat fragmentation and degradation of riparian woodlands due to agricultural and residential development (Hughes 1999). The proposed transmission line may cross potential cuckoo habitat; however, construction within riparian habitats will be minimized to the greatest extent possible. Placement of the transmission line may impact individuals of this species, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted.

Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

3.4 REPTILES AND AMPHIBIANS

Giant spotted whiptail (*Cnemidophorus burti strictogrammus*)
The giant spotted whiptail is a long, slender lizard found in southeastern Arizona, extreme southwest New Mexico, and northern Sonora, Mexico. Within southeastern Arizona, this lizard is found in Cochise County; the Santa Catalina, Santa Rita, Baboquívari, and Pajarito mountains and in the vicinity of Oracle in Pima County; and in Pinal County. Giant spotted whiptail lizards inhabit mountain canyons, arroyos, and mesas in arid and semi-arid regions, entering lowland deserts along stream courses. They are found in dense shrubby vegetation, often among rocks near permanent and intermittent streams at elevations ranging from near sea level to 1,372 m (4,500 ft). Open areas of bunch grass within these riparian habitats are also occupied (AGFD 2001b).

Giant spotted whiptail populations are thought to be stable and some populations are locally abundant even though this species is limited in distribution (AGFD 2001b). Because the known populations occur outside the project area, the proposed transmission line will have no significant effect on the population status of the giant spotted whiptail.

Lowland leopard frog (*Rana yavapaiensis*)
The lowland leopard frog is found in low elevations in the drainage of the lower Colorado River and its tributaries in Nevada, California, Arizona, New Mexico, northern Sonora and extreme northeast Baja California, Mexico (probably extirpated from California and Nevada). Within Arizona, this frog has been found in the Virginia River drainage in the extreme northwestern part of the state, in the Colorado River near Yuma, and west, central, and southeast Arizona south of the Mogollon Rim. This frog frequents desert, grassland, oak, and oak-pine woodland in permanent pools of foothill streams, rivers, and permanent stock tanks. They typically stay close to water at elevations ranging from 244 to 1,676 m (800 – 5,500 ft) (AGFD 1997b). Within the Nogales RD, this frog has been recorded in Pesquiera and Alamo canyons, California Gulch, Adobe, Temporal Gulch, Big Casa Blanca, Box Canyon, and Gardner Canyon (T. Newman, CNF, pers. comm., 20 August 2002).

Lowland leopard frog populations are considered stable in central Arizona but declining in southeast Arizona, and populations have been extirpated from southwestern Arizona. Potential threats to this species are manipulation to major watercourses, water pollution, introduced species (fish, bullfrogs, and crayfish), heavy grazing, and habitat fragmentation (AGFD 1997b). Because no construction will occur within perennial aquatic habitats and known populations occur outside project area, the proposed transmission line will have no significant effect on the population status of the lowland leopard frog.

Mexican garter snake (*Thamnophis eques megalops*)
The Mexican garter snake ranges from southeastern Arizona and extreme southwestern New Mexico, southward into the highlands of western and southern Mexico, to Oaxaca. Within Arizona, this snake occurs in the southeast corner of the state from the Santa Cruz Valley east and generally south of the Gila River. Valid records (post 1980) have recorded this snake in the San Rafael and Sonoita grasslands area and from Arivaca. Mexican garter snakes are most abundant in densely vegetated desert grassland habitat surrounding cienegas, cienega-streams, stock tanks, and in or near water along streams in valley floors and generally open areas, but not in steep mountain canyon stream habitat. This snake is generally found at elevations ranging from 914 to 1,524 m (3,000 – 5,000 ft) but may reach elevations of 2,591 m (8,500 ft) (AGFD 2001c).

Populations of Mexican garter snakes are decreasing, with extirpations at several localities since 1950 as habitat has changed and introduced predators have invaded. Management concerns for this species include predation by introduced bullfrogs and predatory fishes, urbanization and lowered water tables, and habitat destruction, including that due to overgrazing (AGFD 2001c). Because no construction will occur within perennial aquatic habitats and construction within riparian habitats will be minimized, the proposed transmission line will have no significant effect on the population status of the Mexican garter snake.

Western barking frog (*Eleutherodactylus augusti cactorum*)
The western barking frog is a secretive terrestrial frog found in extreme southern Arizona, southeast New Mexico, and central Texas south to the Isthmus of Tehuantepec. In Arizona, this frog historically occurred in Pima and Santa Cruz counties within the Santa Rita and Pajarito mountains. Habitat consists of rocky hillsides of canyons in woodland vegetation at elevations between 1,158 and 2,134 m (3,800 – 7,000 ft). Permanent water is not a necessary component of western barking frog habitat. There are very few records of this species in Arizona, and none have been recorded within the Nogales RD (AGFD 1995b).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of western barking frogs (AGFD 1995b). Because known populations occur outside the project area, the proposed transmission line will have no significant effect on the population status of the western barking frog and is not likely to result in a trend toward listing or loss of viability.

3.5 MAMMALS

Cave myotis (*Myotis velifer*)
The cave myotis is a large bat found in the southwestern half of Arizona and the immediate adjacent parts of California, Nevada, New Mexico, and the northern third of Sonora, Mexico. Within Arizona, this bat is found south of the Mogollon Plateau from Lake Mohave, Burro Creek, Montezuma Well, San Carlos Apache Reservation, and the Chiricahua Mountains south to Mexico. Cave myotis have not been recorded in the extreme southwestern part of the state and are found in small numbers in southeastern

Arizona in the winter. This bat typically prefers desertscrub habitats of creosote, brittlebush, paloverde, and cacti but they sometimes can be found up in pine-oak communities. Cave myotis roost in caves, tunnels, mineshafts, under bridges, and sometimes buildings within a few kilometers of a water source (AGFD 1997c).

Cave myotis colonies are vulnerable at the roost sites, especially maternity roosts, because the congregate in large numbers (AGFD 1997c). The proposed TEP transmission line will not cross near known roost sites. Potential foraging habitat may be disturbed during development of the transmission line; however, these disturbances will be isolated and widely distributed. Furthermore, populations of this species occur throughout southern Arizona. Therefore, impacts will not likely result in a trend toward federal listing or loss of viability of the cave myotis.

Southern pocket gopher (*Thomomys umbrinus intermedius*)
The southern pocket gopher is a small gopher found in extreme southeastern Arizona and southwestern New Mexico, south into Mexico. Within Arizona, this gopher is found primarily in the southern most portion of the state in the oak belt of the Santa Rita, Patagonia, Atascosa, Pajarito, and Huachuca mountains. Southern pocket gophers have been found at Peña Blanca Spring in gravelly soil along a broad wash. Elsewhere, this species is generally found on rocky slopes within open oak woodlands in the lower parts of mountain ranges from 1,372 to 2,743 m (4,500 – 9,000 ft) in elevation. There has been only 1 record for the southern pocket gopher within the Nogales RD, specifically at Peña Blanca Canyon in the Atascosa/Pajarito mountains. However, it is suspected that this species has a much wider range (AGFD 1998h).

There is no information on the potential effects of land use activities, such as utility placement, on the population status of southern pocket gopher (AGFD 1998h). Placement of the transmission line may impact individuals of this species, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

4.0 BLM SENSITIVE SPECIES

Criteria for BLM Sensitive species include those that are:

1. Under status review by the USFWS, or
2. Whose numbers are declining so rapidly that Federal listing may become necessary, or
3. With typically small and widely dispersed populations,
4. Those inhabiting ecological refugia or other specialized or unique habitats.

The potential impacts to BLM Sensitive species were determined based on the habitat conditions within the BLM lands crossed by the proposed action, the life history of the species, and the proposed construction methods. Only those species that have a potential of occurring on or near the BLM parcel were evaluated. The 13 BLM Sensitive species evaluated were identified in the BLM Sensitive species list for Arizona (Instruction Memorandum No. AZ-2000-018) dated 21 April 2000 and are listed in Table4.

TABLE 4. SUMMARY OF EFFECTS ON BUREAU OF LAND MANAGEMENT SENSITIVE SPECIES.

COMMON NAME *Scientific Name*	EFFECTS DETERMINATION	JUSTIFICATION
Balloonvine *Cardiospermum corindum*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
False grama *Cathestecum erectum brevifolium*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Tumamoc globeberry *Tumamoca macdougalii*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Loggerhead shrike *Lanius ludovicianus*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur throughout southern Arizona.
Rufous-winged sparrow *Aimophila carpalis*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.

TABLE 4 (CONTINUED). SUMMARY OF EFFECTS ON BUREAU OF LAND MANAGEMENT SENSITIVE SPECIES.		
COMMON NAME ***Scientific Name***	**EFFECTS DETERMINATION**	**JUSTIFICATION**
Western burrowing owl *Athene curnicularia hypugea*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total population within project area may be impacted. • Populations of this species occur throughout southwestern U.S.
Texas horned lizard *Phrynosoma cornutum*	No Impacts.	• Known populations occur outside project area.
Big free-tailed bat *Nyctinomops macrotis*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• No known roosts within project area. • Only small percentage of foraging habitat within project area may be impacted. • Populations of this species occur throughout southern Arizona.
California leaf-nosed bat *Macrotus californicus*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• No known roosts within project area. • Only small percentage of foraging habitat within project area may be impacted. • Populations of this species occur throughout southern Arizona.
Fringed myotis *Myotis thysandodes*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• No known roosts within project area. • Only small percentage of foraging habitat within project area may be impacted. • Populations of this species occur throughout southern Arizona.
Pocketed free-tailed bat *Nyctinomops femorosaccus*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• No known roosts within project area. • Only small percentage of foraging habitat within project area may be impacted. • Populations of this species occur throughout southern Arizona.
Spotted bat *Euderma maculatum*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• No known roosts within project area. • Only small percentage of foraging habitat within project area may be impacted. • Populations of this species occur throughout southern Arizona.
Underwood's mastiff bat *Eumops underwoodi*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• No known roosts within project area. • Only small percentage of foraging habitat within project area may be impacted. • Populations of this species occur throughout southern Arizona.

4.1 PLANTS

Balloonvine (*Cardiospermum corindum*)
This perennial vine is widely distributed in tropical and subtropical regions and is known from the Coyote Mountains in Pima County (Kearny and Peebles 1960). Because potential habitat for this species is widespread, placement of the transmission line may impact individual plants. However because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

False grama (*Cathestecum erectum* (*brevifolium*))
False grama is a perennial, drought-tolerant grass found on dry hills and plains of Southern Arizona and Northern Mexico. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Tumamoc globeberry (*Tumamoca macdougalii*)
This perennial vine occurs in shade of nurse plants along sandy washes below ~914 m (3,000 ft) in elevation. The proposed transmission line may cross potential habitat for this species; however, construction within riparian habitats will be minimized to the greatest extent possible. Placement of the transmission line may impact individual plants, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside the project area. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

4.2 BIRDS

Loggerhead shrike (*Lanius ludovicianus*)
The loggerhead shrike occurs in open country with scattered trees and shrubs, savanna, desertscrub and occasionally open woodland (AGFD 2002). In Arizona, this species usually summers throughout open parts of the state below the Transition Zone and is also periodically found along the Mexican border west of Baboquívari Mountains (Phillips et al. 1983). Because habitat for this species is widely distributed, placement of the transmission line may impact this species. However because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur throughout southern Arizona. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Rufous-winged sparrow (*Aimophila carpalis*)
The rufous-winged sparrow is classified as a migratory bird and is a resident of eastern Pima County, including Avra Valley, and was once thought to be extirpated in Arizona due to overgrazing but was rediscovered in the Tucson Area in 1936. Rufous-winged sparrows generally use habitats characterized by scattered low shrubs and trees, which provide cover and foraging areas during mid-summer days. Many of these areas contain significant grassland components. Threats to the species include urban development, overgrazing, and exotic species, all of which result in losses of grassland communities utilized by this species (Pima County 2001). Because habitat for this species is widely distributed, placement of the transmission line may impact this species. However because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside the project area. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

Western burrowing owl (*Athene cunicularia hypugea*)
The Western burrowing owl inhabits heavily grazed tracts of mixed-grass prairie, particularly where there are burrows created by large rodents, such as prairie dogs and Richardson ground squirrels. Distribution extends from southern Canada through the western United States to South America. Arizona is 1 of 3 states that provide important wintering areas for this species (USGS 2003). Because habitat for this species is widely distributed, placement of the transmission line may impact this species. However because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur throughout the southwestern United States. Therefore, impacts are not likely to result in a trend toward federal listing or loss of viability.

4.3 REPTILES AND AMPHIBIANS

Texas horned lizard (*Phrynosoma cornutum*)
The Texas horned lizard occurs from Kansas to extreme southeastern Arizona and lives mainly in sandy areas of deserts, grasslands, prairies, and scrublands (Bartlett and Bartlett 1999) where it often inhabits abandoned animal burrows (Bockstanz 1998). Because known populations occur outside of the project area, the proposed transmission line will have no significant effect on the population status of this species.

4.4 MAMMALS

Big free-tailed bat (*Nyctinomops macrotis*)
Distribution of the big free-tailed bat occurs from the southwestern United States southward through the Caribbean, Central America, and into the northern part of South America. Northern populations are known to migrate to southern Arizona and Mexico in the fall, yet this species is widely scattered throughout Arizona during the spring and summer too. In Arizona, this bat has been found in pinyon-juniper, Douglas-fir, and Sonoran desertscrub habitats, but it is believed that these locations are foraging sites. Preferred roosting sites include rock crevices and fissures of mountain cliffs in rugged,

rocky areas of desertscrub habitat (AGFD 1993, Harvey et al. 1999). The proposed TEP transmission line will not cross near known roost sites, but potential foraging habitat may be disturbed during development of the transmission line; however, these disturbances will be isolated and widely distributed. Furthermore, populations of this species occur throughout southern Arizona. Therefore, impacts will not likely result in a trend toward federal listing or loss of viability of the big free-tailed bat.

California leaf-nosed bat (*Macrotus californicus*)
Distribution of the California leaf-nosed bat in the United States spans southern California, southern Nevada, and southwestern Arizona and extends southward into Mexico, to the southern tip of Baja California, northern Sinaloa, and southwestern Chihuahua. This bat lives predominantly in Sonoran and Mohave desertscrub habitats, but is occasionally found in the Chihuahuan and Great Basin deserts. Daytime roosting sites are usually mines and caves, and nighttime roosts include open buildings, cellars, bridges, porches, and mines. These bats do not hibernate or migrate; therefore, they tend to live in the same area year after year and remain active year-round (AGFD 1993, 2001d; Harvey et al. 1999). The proposed TEP transmission line will not cross near known roost sites, but potential foraging habitat may be disturbed during development of the transmission line; however, these disturbances will be isolated and widely distributed. Furthermore, populations of this species occur throughout southern Arizona. Therefore, impacts will not likely result in a trend toward federal listing or loss of viability of the California leaf-nosed bat.

Fringed myotis (*Myotis thysandodes*)
Distribution of the fringed myotis ranges from southern British Columbia, Canada southward throughout the western United States, and down to southern Mexico. It occurs in a variety of habitats – from desertscrub to oak and pinyon woodlands to spruce-fir forests. Roosting sites include caves, mines, and buildings. These bats tend to roost in tight clusters and may change locations periodically in response to thermoregulatory needs (AGFD 1993, Harvey et al. 1999). The proposed TEP transmission line will not cross near known roost sites, but potential foraging habitat may be disturbed during development of the transmission line; however, these disturbances will be isolated and widely distributed. Furthermore, populations of this species occur throughout southern Arizona. Therefore, impacts will not likely result in a trend toward federal listing or loss of viability of the fringed myotis.

Pocketed free-tailed bat (*Nyctinomops femorosaccus*)
The pocketed free-tailed bat ranges from the southwestern United States (including southern California, Arizona, and New Mexico, and the Trans-Pecos region of Texas), south into Mexico through Baja, Sonora, Durango, and Jalisco to, at least, Michoacan. This bat can be found in the arid lowlands of the desert Southwest, where it roosts in crevices and caves of rugged cliffs, slopes, and rock outcrops (AGFD 1993, Harvey et al. 1999). The proposed TEP transmission line will not cross near known roost sites. Potential foraging habitat may be disturbed during development of the transmission line; however, these disturbances will be isolated and widely distributed and will not likely result in a trend toward federal listing or loss of viability of this species.

Spotted bat (*Euderma maculatum*)
Distribution of the spotted bat ranges throughout centralwestern North America, from southcentral British Columbia down to southern Mexico. In Arizona, its habitat ranges from low desert areas in the Southwest to high desert and riparian habitats in the northwestern part of the state. This bat has also been documented in conifer forests in northern Arizona. Roosting sites are often situated in rock crevices on high cliffs (AGFD 1993, Harvey et al. 1999). The proposed TEP transmission line will not cross near known roost sites, but potential foraging habitat may be disturbed during development of the transmission line; however, these disturbances will be isolated and widely distributed. Furthermore, populations of this species occur throughout southern Arizona. Therefore, impacts will not likely result in a trend toward federal listing or loss of viability of the spotted bat.

Underwood's mastiff bat (*Eumops underwoodi*)
The range of Underwood's mastiff bat is limited, from south-central Arizona, into the arid lowlands of Sonoran and western Mexico, and into Honduras. It is believed to be a year-round resident of Arizona, ranging from the Baboquívari Mountains down to Organpipe National Monument. This bat prefers Sonoran desertscrub and mesquite/grassland plant communities. Roosting tends to occur in crevices along steep cliffs and sometimes in the cracks of buildings (AGFD 1993). The proposed TEP transmission line will not cross near known roost sites, but potential foraging habitat may be disturbed during development of the transmission line; however, these disturbances will be isolated and widely distributed. Furthermore, populations of this species occur throughout southern Arizona. Therefore, impacts will not likely result in a trend toward federal listing or loss of viability of this species.

5.0 AGFD WILDLIFE OF SPECIAL CONCERN

AGFD was consulted in regards to state listed special status species and habitats that may be affected by the proposed action. Several state listed special status species and overall wildlife habitat may be affected by the proposed action. The AGFD mission is to conserve, enhance, and restore Arizona's diverse wildlife resources and habitats through aggressive protection and management programs. Continued consultation and input from AGFD will ensure that impacts of the proposed action are minimized and mitigation efforts are successful.

Listed in Table 5 are state special status species that may be found in the vicinity of the proposed action, based on AGFD's Heritage Data Management System (HDMS) (1 July 2002). Effects of the proposed action on the majority of these species will be avoided or minimized through mitigation efforts stipulated for federally listed species. However, additional mitigation is recommend for the Sonoran Desert tortoise as 5 individuals were located near the Tinaja Hills area during field surveys of the proposed ROW (HEG 2002, unpublished data).

TABLE 5. SUMMARY OF EFFECTS ON WILDLIFE OF SPECIAL CONCERN IN ARIZONA.

COMMON NAME *Scientific Name*	EFFECTS DETERMINATION	JUSTIFICATION
Black-bellied whistling duck *Dendrocyna autumnalis*	No Impacts.	• No construction in perennial aquatic habitats.
Crested caracara *Caracara cheriway*	No Impacts.	• Known populations occur outside project area.
Desert tortoise - Sonoran population *Gopherus agassizii*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total potential habitat within project area may be impacted. • Pre-construction surveys will minimize impacts to species.
Elegant trogon *Trogon elegans*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Populations of this species occur in isolated mountain ranges throughout southern Arizona.
Great Plains narrow-mouthed toad *Gastrophryne olivacea*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.
Mexican long-tongued bat *Choeronycteris mexicana*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Only small percentage of total potential habitat within project area may be impacted. • Mitigation plantings of agaves will reduce impacts.

TABLE 5 (CONTINUED). SUMMARY OF EFFECTS ON WILDLIFE OF SPECIAL CONCERN IN ARIZONA.		
COMMON NAME *Scientific Name*	EFFECTS DETERMINATION	JUSTIFICATION
Mexican vine snake *Oxibelis aeneus*	No Impacts.	• Known occurrences are outside project area.
Osprey *Pandion haliaetus*	No Impacts	• No construction in perennial aquatic habitats.
Rose-throated becard *Pachyramphus aglaiae*	No Impacts.	• Known occurrences are outside project area.
Thick-billed kingbird *Tyrannus crassirostris*	No Impacts	• No potential habitat within project area.
Tropical Kingbird *Tyrannus melancholicus*	May impact individuals of this species, but is not likely to result in a trend toward federal listing or loss of viability.	• Minimal impacts to riparian habitat. • Only small percentage of total population within project area may be impacted. • Other viable populations occur outside of project area.

Black-bellied whistling duck (*Dendrocyna autumnalis*)
The black-bellied whistling duck is "goose-like" with a long neck and long pink legs. This species has a cinnamon or chestnut breast and back with a black belly and bright coral-red bill. The total range for this species is from the Gulf coast and lower Rio Grande Valley of Texas and central Arizona south through Mexico, Central America to southern Brazil. In Arizona, the range for the black-bellied whistling duck is southeastern and central Arizona. Black-bellied whistling ducks are commonly seen in the Santa Cruz Valley, particularly in ponds near and around Nogales. The habitat for this species consists of the banks of rivers, lakes, ponds, riparian areas, and stock tanks (Brown 1985).

Because of habitat loss and apparent population declines from historic levels, the black-bellied whistling duck has been placed on the AGFD Threatened Native Wildlife of Arizona List as a candidate species. This species appears to be increasing in Arizona in urban settings at man-made ponds and at sewage treatment plants. It also appears to be stable at some private ranch ponds, which tend to be isolated from hunting pressure (Corman 1994).

Because no construction will occur in perennial aquatic habitats, the proposed transmission line will have no effect on the population status of the black-bellied whistling duck.

Crested caracara (*Caracara cheriway*)
The crested caracara is a medium sized raptor with bold black and white plumage and a bright yellow-orange face and legs. The crested caracara ranges from southern Arizona

and northern Mexico to Tierra del Fuego. In the United States, it occurs only along the southern border in Texas and Arizona, and in Florida, where there is an isolated population in the south-central peninsula. In Arizona, their range extends up from San Miguel in the Baboquivari Valley north to Quijotoa, Sells, and Coyote Pass. This raptor occurs regularly on the Tohono O'odham Indian Reservation. Small groups of crested caracara are seen in Sasabe and south of the Mexican border near Sonoyta, Sonora. This raptor is found in open habitats, typically grassland, prairie, pastures, or desert with scattered taller trees, shrubs, or cacti. The crested caracara is found in areas characterized by low-profile ground vegetation and scattered tall vegetation. Specifically in Arizona, vegetation consists of saguaro, mesquite, paloverde, cholla and acacia (Morrison 1996).

Arizona populations of crested caracara on the Tohono O'odham Reservation are likely stable because few threats exist. Reports of individual, and in some cases groups, of this raptor outside of the reservation indicate that its range within Arizona is probably as extensive as it was historically. No apparent threat currently exits to Arizona populations; however, the AGFD has listed the crested caracara as a threatened native wildlife. This species is considered vulnerable if habitat conditions worsen (Morrison 1996).

Habitat surveys did not detect the presence of any bird of prey nests along the corridor. Furthermore, no know populations of this species occur within the project area. Therefore, the proposed action will have no effect on the population status of the crested caracara.

Desert tortoise (Sonoran) (*Gopherus agassizii*)
The Sonoran Desert tortoise ranges from northern Sinaloa, Mexico to southern Nevada and southwestern Utah, and from southcentral California east to southeastern Arizona. The desert tortoise is divided into 2 populations for purposes of the Endangered Species Act. The threatened Mojave population occurs north and west of the Colorado River and the unlisted Sonoran population occurs south and east of the Colorado River. Within Arizona, the Sonoran Desert tortoise is found south and east of the Colorado River from Mojave County to the south, beyond the International Boundary and many scattered locations in between. The Sonoran population of the desert tortoise occurs primarily on rocky slopes and bajadas of Mojave and Sonoran desertscrub at elevations ranging from 152 to 1,615 m (500 – 5,300 ft). Burrows and shelter sites are generally below rocks and boulders, in rock crevices, under vegetation, and also in caliche caves of incised wash banks (AGFD 2001e).

Several threats to tortoise populations in the Sonoran Desert have been identified, including habitat fragmentation, habitat loss and degradation from urban and agricultural development and roads, wildfires associated with invasion of non-native grasses and forbs, illegal collection, and genetic contamination of wild populations by escaped or released captives. Although current evidence suggests that Arizona populations are stable there are substantial gaps in available data (Arizona Interagency Desert Tortoise Team 1996).

During ground surveys of the proposed transmission line corridor, 5 desert tortoise were found (HEG, unpublished data). Per recommendations of Spencer and Humphrey (1999) for any ground disturbing projects, surveys should be conducted a minimum of 48 hours prior to grading and again just prior (as it is occurring) to vegetation clearing (Desert Tortoise Council 1999). While the proposed action may have a minimal effect on the potential habitat of this species, pre-construction surveys will minimize impacts to individual tortoise and is therefore not likely to result in a trend toward listing or loss of viability.

Elegant trogon (*Trogon elegans*)
The elegant trogon is a medium sized bird with a round head, large eyes, a white band on an iridescent green breast, black face and throat, red belly and undertail coverts. The total range for this bird is from southern Arizona and New Mexico south through Mexico to southern Nicaragua to northwestern Costa Rica. In Arizona, the elegant trogon is found in sky island mountains, most commonly the Atascosa, Chiricahua, Huachuca, and Santa Rita mountains. Elegant trogons are found in riparian areas consisting of sycamore, cottonwood, and oak, and also in coniferous woodlands at elevations ranging from 1,036 to 2,073 m (3,400 – 6,800 ft) (AGFD 2001f).

Population trends for the elegant trogon are not well known. No evidence indicates population declines in any of the core canyons occupied over the past few decades. Threats to this species include degradation and loss of native riparian habitat through stream diversion, groundwater withdrawal, erosion, and overgrazing (AGFD 2001f).

The proposed transmission line may cross potential habitat for this species; however, construction within riparian habitats will be minimized to the greatest extent possible. Placement of the transmission line may impact individual trogons, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur in isolated mountain ranges throughout southern Arizona. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Great Plains narrow-mouthed toad (*Gastrophryne olivacea*)
The Great Plains narrow-mouthed toad is a small, stout toad with stubby limbs, a small pointed head with a fold of skin on the back of the head. The total range for this species is from southeastern Nebraska and Missouri south through Texas to western Mexico. Within Arizona, the Great Plains narrow-mouthed toad is found in the vicinity of Santa Cruz County, Pima County, to near Casa Grande, Arizona in Pinal County. Habitat for this species in Arizona consists of mesquite semi-desert grassland communities to oak woodland communities near riparian areas at elevations ranging from sea level to around 1,250 m (4,100 ft) (AGFD 1995c).

Population trends for the Great Plains narrow-mouthed toad are currently unknown. Populations in Arizona are at the extreme northwestern edge of the species range and

distribution is limited throughout its range (AGFD 1995c). The proposed transmission line may cross potential habitat for this species; however, construction within riparian habitats will be minimized to the greatest extent possible. Placement of the transmission line may impact individuals of this species, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside the project area. Therefore, impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Mexican long-tongued bat (*Choeronycteris mexicana*)
The Mexican long-tongued bat has a long, slender nose with a leaf-like structure on the base of the nose. The total range for this species is from southeastern Arizona, southwestern New Mexico, and California south through Central America to Venezuela. In Arizona, the Mexican long-tongued bat is found from the Chiricahua Mountains extending as far north as the Santa Catalina Mountains and west to the Baboquivari Mountains. Habitat for this bat is typically within canyons of mixed oak-conifer forests in mountains at elevations ranging from 1,082 to 2,231 m (3,550 – 7,320 ft) (AGFD 1994). This species do not congregate in sizeable maternity or bachelor colonies like *Leptonycteris* bats do (Hoffmeister 1986). They feed on nectar and pollen, especially from paniculate agaves (AGFD 1994).

Populations of Mexican long-tongued bats in Arizona appear to be highly variable (AGFD 1994) and there is no evidence of a long-term decline or any clear trend. The limitation of riparian zones and the distribution of food plants may limit populations of this species in Arizona and loss of riparian vegetation may be a greater threat to this species than human disturbance at particular roost sites (Pima County 2001). The proposed TEP transmission line will not cross near known roost sites, but potential foraging habitat may be disturbed during construction; however, these disturbances will be isolated and will impact only a small percentage of potential habitat. Furthermore, transplanting of agave plants also will minimize impacts. Impacts to this species are not likely to result in a trend toward federal listing or loss of viability.

Mexican vine snake (*Oxibelis aeneus*)
The Mexican vine snake has an elongated head, pointed snout, and is thin bodied with an ash gray to yellow-brown and tan coloring. The total range for this species is from extreme southern Arizona south to Brazil. In Arizona, this species occurs in the Tumacacori, Pajarito, and Patagonia mountains in Santa Cruz County. Habitat for the Mexican vine snake consists of brush-covered hillsides and riparian areas with sycamore, oak, walnut and wild grape trees at elevations ranging from 914 to 1,768 m (3,000 – 5,800 ft) (AGFD 1991b).

Population trends for the Mexican vine snake are currently unknown. Populations in Arizona are at the extreme northern edge of the species range and distribution is limited, with occurrences known from Sycamore Canyon (AGFD 1991b). A potential threat is the high interest by collectors for this species (AGFD 1991b). Because known

occurrences of this species are outside the project area, the proposed action will have no effect on the population status of the Mexican vine snake.

Osprey (*Pandion haliaetus*)
This raptor is dark brown on its back and white on the underparts with a prominent dark eye stripe. The total range for the osprey is from Alaska to Newfoundland, along the Atlantic and Pacific coastlines, and in the Rocky Mountains south through central and South America. Within Arizona, the osprey occurs primarily in the White Mountains, along the Mogollon Rim, and along the Salt and Verde rivers. In southeastern Arizona, this raptor is an uncommon spring and fall transient, usually seen at ponds and reservoirs. Nesting habitat of the osprey consists of coniferous trees along rivers and lakes at elevations ranging from 1,829 to 2,377 m (6,000 – 7,800 ft) (AGFD 1997d).

Osprey population trends in Arizona are not well known. Only about 20 nest sites are known in the southwest, all within Arizona. This raptor is threatened by loss of nesting habitat and foraging perch sites. It is also threatened by recreational use of nesting habitat, shooting, and pesticide poisoning on wintering grounds (AGFD 1997d).

Because no construction will occur in perennial aquatic habitats, the proposed action will have no effect on the population status of the osprey.

Rose-throated becard (*Pachyramphus aglaiae*)
The rose-throated becard is a big-headed, thick billed bird that breeds in southeast Arizona, southern Texas (rare visitor along the Rio Grande), south through Mexico to Costa Rica. This species winters from northern Mexico south through to its breeding range. Within Arizona, rose-throated becards have been found breeding along Sonoita and Arivaca creeks, Sycamore Canyon (Atascosa Mountains), and Patagonia. Historically, this species nested in Guadalupe Canyon (east of Douglas) and near Tucson. Rose-throated becards typically inhabit marshes of Sonoran desertscrub communities of open to dense vegetation of shrubs, low trees, and succulents dominated by paloverde, prickly pear, and saguaro. This species also is found in the desert riparian deciduous woodland communities of marsh-woodlands, especially of cottonwoods, that occur where desert streams provide sufficient moisture for a narrow band of deciduous trees and shrubs along the margins. In Arizona, the rose-throated becard is found at elevations ranging from 1,082 to 1,228 m (3,550 – 4,030 ft) (AGFD 2001g).

Population trends for the rose-throated becard are currently unknown. Potential threats to this species include disturbance from bird watchers and degradation and loss of native riparian habitat through overgrazing, urban development, and groundwater depletion (AGFD 2001g). Because known occurrences of this species are outside the project area, the proposed action will have no effect on the population status of the rose-throated becard.

Thick-billed kingbird (*Tyrannus crassirostris*)
The thick-billed kingbird is a relatively stocky flycatcher with a large head and heavy bill. This kingbird occurs from southeastern Arizona and southwestern New Mexico

south through western Mexico to western Guatemala. In Arizona, thick-billed kingbirds are most often seen around Sonoita and Arivaca creeks and in Madera and Guadalupe canyons. This species may occur in mountains of Pima, Santa Cruz and Cochise counties where there are drainages with well-developed riparian areas. Habitat for the thick-billed kingbird consists of broad-leaved, riparian forests usually with well-developed large sycamores and cottonwoods at elevations ranging from 914 to 1,981 m (3,000 – 6,,500 ft) (Tibbitts 1991).

Present distribution of the thick-billed kingbirds in Arizona is very limited. Potential threats include human recreational activities, encroachment of human development into breeding habitat, woodcutting, grazing, and groundwater depletion (Tibbitts 1991). Because no potential habitat occurs within the project area, the proposed action will have no effect on the population status of the thick-billed kingbird.

Tropical Kingbird (*Tyrannus melancholicus*)
The tropical kingbird is a large tyrant-flycatcher with a large bill and long, slightly notched tail. The tropical kingbird ranges from southeastern Arizona through western and central Mexico to central Argentina. Breeding birds have been found in Tucson, along the Santa Cruz Valley from Green Valley south, east of Phoenix in the Salt River Valley, to the San Pedro Valley. This species also has been reported from Sopori Wash. The Tropical Kingbird inhabits open and semi-open areas with scattered trees and shrubs. Also found in urban areas and roadsides with tall human-made fixtures (Stouffer and Chesser 1998).

Tropical kingbirds seem to persist or even thrive in developed areas. No negative effects of human activities have been reported (Stouffer and Chesser 1998). The proposed transmission line may cross potential habitat for this species; however, construction within riparian habitats will be minimized to the greatest extent possible. Placement of the transmission line may impact individual tropical kingbirds, however because of the linear nature of the project, only a small percentage of the population within the project area may be impacted. Furthermore, populations of this species occur outside of the project area. Therefore, impacts to tropical kingbirds are not likely to result in a trend toward federal listing or loss of viability.

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7.0 LIST OF ACRONYMS

ACC	Arizona Corporation Commission
ADEQ	Arizona Department of Environmental Quality
AGFD	Arizona Game and Fish Department
AOU	American Ornithologists' Union
ASLD	Arizona State Land Department
AUM	Animal Unit per Month
BA	Biological Assessment
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
CFPO	Cactus Ferruginous Pygmy Owl
Citizens	Citizens Communications
CLF	Chiricahua Leopard Frog
CNF	Coronado National Forest
DBH	Diameter Breast Height
DOE	Department of Energy
EMA	Ecosystem Management Area
ESA	Endangered Species Act
GPS	Global Positioning System
HDMS	Heritage Data Management System
HEG	Harris Environmental Group, Inc.
I-19	Interstate 19
LLNB	Lesser Long-nosed Bat
MOA	Memorandum of Agreement
MSO	Mexican Spotted Owl
NPDES	National Pollutant Discharge Elimination System
OHV	Off-Highway Vehicle
PAC	Protected Activity Center

PPC	Pima Pineapple Cactus
RNA	Research Natural Area
ROW	Right-of-way
RD	Ranger District
RU	Recovery Units
SL	Standard Length
SWFL	Southwestern Willow Flycatcher
TEP	Tucson Electric Power
USDOI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
USFS	United States Department of Agriculture Forest Service
YOY	Young-of-the-year

APPENDIX A

Natural Resource Agencies Correspondence.

1. U.S. Fish and Wildlife Service, dated 14 May 2002.

2. Arizona Game and Fish Department, dated 25 April 2002.

APPENDIX B

Plants documented along proposed ROW of the TEP Citizens Interconnect Project, July to October 2002.

	SCIENTIFIC NAME	COMMON NAME	FAMILY
CACTUS & SUCCULENTS			
	Agave parryi	century plant	Agavaceae
	Agave schottii	shindagger	Agavaceae
	Coryphantha scheeri var. *robustispina*	Pima pineapple cactus	Cactaceae
	Dasylirion wheeleri	sotol	Agavaceae
	Echinocereus spp.	hedgehog cactus	Cactaceae
	Echinocereus pectinatus var. *rigidissimus*	Arizona rainbow cactus	Cactaceae
	Ferocactus wislizenii	fishhook barrel cactus	Cactaceae
	Fouquieria splendens	ocotillo	Fouquieriaceae
	Mammillaria spp.	pincushion cactus	Cactaceae
	Nolina microcarpa	beargrass	Agavaceae
	Opuntia spp.	cholla	Cactaceae
	Opuntia spp.	prickly pear	Cactaceae
	Opuntia spinosior	walkingstick cactus	Cactaceae
	Yucca elata	soaptree yucca	Agavaceae
GRASSES			
	Bouteloua barbata or *B. rothrockii*	six-weeks or Rothrock grama	Poaceae
	Bothriochloa barbinodis	cane beard grass	Poaceae
	Bouteloua curtipendula	side oats grama	Poaceae
	Bouteloua gracilis	blue grama	Poaceae
	Bouteloua hirsuta	hairy grama	Poaceae
	Bouteloua parryi	Parry grama	Poaceae
	Bouteloua repens	slender grama	Poaceae
	Digitaria californica	Arizona cottontop	Poaceae
	Erioneuron pulchellum	fluffgrass	Poaceae
	Hilaria belangeri	curly mesquite	Poaceae
	Leptochloa dubia	green sprangletop	Poaceae
	Muhlenbergia emersleyi	bull grass	Poaceae
	Muhlenbergia rigens	deer grass	Poaceae
	Piptochaetium fimbriatum	pinyon rice grass	Poaceae
	Sporobolus spp.	dropseed	Poaceae
FORBS			
	Abutilon incanum	Indian mallow	Malvaceae
	Allionia incarnata	trailing windmills	Nyctaginaceae
	Ambrosia confertiflora	weakleaf burr ragweed	Asteraceae
	Amoreuxia palmatiflida	Arizona yellow show	Cochlospermaceae
	Argemone sp.	prickly poppy	Papaveraceae
	Artemisia ludoviciana		Asteraceae
	Asclepias asperula	antelope horns	Asclepiadaceae
	Asclepias nummularia	tufted milkweed	Asclepiadaceae
	Asclepias tuberosa	butterfly milkweed	Asclepiadaceae
	Aspicarpa hirtella	aspicarpa	Malpighiaceae
	Boerhaavia coccinea	red spiderling	Nyctaginaceae
	Bouchea prismatica	bouchea	Verbenaceae

	SCIENTIFIC NAME	COMMON NAME	FAMILY
FORBS (*Cont.*)			
	Bouvardia glaberrima	smooth bouvardia	Rubiaceae
	Brickellia spp.	brickellbush	Asteraceae
	Chamaecrista serpens var. *wrightii*	sensitive pea	Fabaceae
	Cheilanthes fendleri	cloak fern	Pteridaceae
	Cheilanthes spp.	claok fern	Pteridaceae
	Chenopodium fremontii	lamb's quarter	Chenopodiaceae
	Clitoria mariana	butterfly pea	Fabaceae
	Cnidosculus angustidens	mala mujer	Euphorbiaceae
	Cologania longifolia	narrowleaf tick clover	Fabaceae
	Commelina dianthifolia	western dayflower	Commelinaceae
	Cucurbita digitata	coyote gourd	Cucurbitaceae
	Datura metaloides	sacred datura	Solanaceae
	Eleocharis spp.	spikerush	Cyperaceae
	Eriogonum wrightii	buckwheat	Polygonaceae
	Eryngium heterophylla	button snakeroot	Apiaceae
	Evolvulus alsinoides		Convolvulaceae
	Evolvulus arizonicus	Arizona blue eyes	Convolvulaceae
	Galium wrightii	northern bedstraw	Rubiaceae
	Glandularia gooddingii	verbena	Verbenaceae
	Gnaphalium leucocephalum	white cudweed	Asteraceae
	Gnaphalium wrightii	cudweed	Asteraceae
	Gomphrena sp.	globe amaranth	Amarnathaceae
	Gutierrezia spp.	snakeweed	Asteraceae
	Ipomoea barbatisepala	morning glory	Convolvulaceae
	Ipomoea coccinea	scarlet creeper	Convolvulaceae
	Ipomoea hirsutula	wooly morning glory	Convolvulaceae
	Ipomoea leptotoma	bird's foot morning glory	Convolvulaceae
	Ipomoea longifolia	long leaf morning glory	Convolvulaceae
	Isocoma tenuisecta	burroweed	Asteraceae
	Jatropha macrorhiza	Arizona desert potato	Euphorbiaceae
	Kallstroemia grandiflora	Arizona caltrop	Zygophyllaceae
	Krameria parvifolia	range ratany	Krameriaceae
	Machaeranthera spp.	spiny aster	Asteraceae
	Macroptilium gibbosifolium	variableleaf bushbean	Fabaceae
	Milla biflora	Mexican star	Liliaceae
	Oenothera rosea	evening primrose	Onagraceae
	Oxalis albicans	wild oxalis	Oxalidaceae
	Penstemon linarioides	linear leaf penstemmon	Scrophulariaceae
	Phaseolus ritensus	eggleaf stringbean	Fabaceae
	Phaseolus sp.	stringbean	Fabaceae
	Portulaca suffrutescens	portulaca	Portulacaceae
	Portulaca umbraticola	portulaca	Portulacaceae
	Proboscidea sp.	unicorn plant, devil's claw	Pedaliaceae
	Salvia subincisa	sawtooth sage	Lamiaceae

	SCIENTIFIC NAME	COMMON NAME	FAMILY
FORBS (*Cont.*)			
	Schoenocrambe linearifolia	schoenocrambe	Brassicaceae
	Scirpus sp.	bulrush	Cyperaceae
	Senna covesii	desert senna	Fabaceae
	Senna hirsuta	woolly senna	Fabaceae
	Solanum douglassii	greenspot nightshade	Solanaceae
	Solanum elaeagnifolium	silverleaf nightshade	Solanaceae
	Sphaeralcea spp.	globe mallow	Malvaceae
	Tagetes sp.	marigold	Asteraceae
	Talinum angustissimum	talinum	Portulacaceae
	Talinum aurantiacum	orange fameflower	Portulacaceae
	Tetramerium hispidum	tetramerium	Acanthatceae
	Thalictrum fendleri	Fendler's meadow rue	Ranunculaceae
	Vitis arizonica	Arizona grape	Vitaceae
	Zinnia acerosa	desert zinnia	Asteraceae
TREES & SHRUBS			
	Acacia angustissima	white ball acacia	Fabaceae
	Acacia constricta	whitethorn acacia	Fabaceae
	Acacia greggii	catclaw acacia	Fabaceae
	Aloysia wrightii	oreganillo	Verbenaceae
	Arctostaphylos sp.	manzanita	Ericaceae
	Baccharis salicifolia	seep willow	Asteraceae
	Baccharis sarothroides	desert broom	Asteraceae
	Calliandra eriophylla	fairyduster	Fabaceae
	Celtis pallida	desert hackberry	Ulmaceae
	Celtis reticulata	netleaf hackberry	Ulmaceae
	Chrysothamnus teretifolius	green rabbitbrush	Asteraceae
	Dodonaea viscosa	hopbush	Sapindaceae
	Ericameria laricifolia	turpentine bush	Asteraceae
	Erythrina flabelliformis	coral bean	Fabaceae
	Eysenhardtia orthocarpa	kidney wood	Fabaceae
	Fraxinus velutina	velvet ash; Arizona ash	Oleaceae
	Gossypium thurberi	desert cotton	Malvaceae
	Guardiola platyphylla	Apache plant	Asteraceae
	Hibiscus coulteri	desert rosemallow	Malvaceae
	Indigofera spaerocarpa	Sonoran Indigo	Fabaceae
	Juglans major	Arizona walnut	Juglandaceae
	Juniperus deppeana	alligator juniper	Cupressaceae
	Lasianthaea podocephala	San Pedro daisy	Asteraceae
	Lycium spp.	wolfberry	Solanaceae
	Mimosa biuncifera	catclaw mimosa	Fabaceae
	Mimosa dysocarpa	velvet pod mimosa	Fabaceae

	SCIENTIFIC NAME	COMMON NAME	FAMILY
TREES & SHRUBS *(Cont.)*			
	Parkinsonia microphylla	yellow paloverde	Fabaceae
	Populus fremontii	Fremont cottonwood	Salicaceae
	Prosopis velutina	velvet mesquite	Fabaceae
	Q. arizonica	Arizona white oak	Fagaceae
	Q. garrya	silktassel	Fagaceae
	Quercus emoryii	Emory oak	Fagaceae
	Rhus aromatica	skunkbush	Anacardiaceae
	Rhus choriophylla	sumac	Anacardiaceae
	Salix exigua	coyote willow	Salicaceae
	Tamarix pentandra	salt cedar	Tamaricaceae
	Ziziphus obtusifolia	graythorn	Rhamnaceae

APPENDIX C

TEP-Citizen's Interconnect Project

Environmental Training Guidelines for Construction Supervisors

- Stay in the designated work areas. Approved work areas, access roads, and staging areas will be clearly marked. All project activities must remain in these areas. Do not work or trespass beyond the signed or fenced restricted work areas.
- Restrict vehicle access to public roadways and designated access roads. Cross-country driving is prohibited.
- No driving or parking within 100 feet of ponds and tanks.
- Do not transfer water from one pond or tank to another or between any other bodies of water.
- No in-stream activity or disposal of construction debris or fill is allowed.
- Store topsoil and trench spoils behind sediment control structures at least 20 feet from any stream bank, including dry washes.
- Check equipment for leaks or heavy surface oil build-up before working in streams or washes.
- The use or transfer of hazardous materials will not be allowed within 100 feet of any stream or wash is prohibited.
- Do not litter. Dispose of trash in designated containers. Uncontained trash can attract wildlife and unwanted pests. Cigarette butts are considered litter, and should be extinguished and disposed of appropriately. All litter and construction debris must be removed from the job site daily.
- No pets or firearms. They are prohibited for job-site protection and protection of wildlife.
- Hunting is prohibited.
- Clearing will be limited to the minimum required to provide a safe construction area. Make sure you know the clearing limit, and if possible, leave plant root systems in place when clearing vegetation.
- It is illegal to harm, harass, pursue, hunt, shoot, wound, trap, kill capture, or collect wildlife officially listed as threatened or endangered. Violation of threatened and endangered special laws can result in penalties of up to $100,000 and/or 1year in jail.
- Do not approach or feed wildlife. Keep away form their burrows and nests. Do not harm or kill any wildlife encountered.
- If animal is harmed or found harmed, contact your Construction Supervisor or the Environmental Inspector. Do not attempt to move the animal yourself.

APPENDIX D

APPENDIX D. Federally Listed, Proposed, and Candidate Species under jurisdiction of the U.S. Fish and Wildlife Service in Pima County, Arizona as of 14 August 2002, excluded from further consideration.

COMMON NAME	SCIENTIFIC NAME	STATUS	HABITAT	JUSTIFICATION
PLANTS				
Canelo Hills ladies' tresses	*Spiranthes delitescens*	Endangered	Finely grained, highly organic, saturated soils of cienegas. Potential habitat occurs in Sonora, Mexico, but no populations have been found.	No habitat present.
Huachuca water umbel	*Lilaeopsis schaffneriana* ssp. *recurva*	Endangered	An emergent aquatic plant that requires marshy wetlands.	No habitat present.
Kearney's blue star	*Amsonia kearneyana*	Endangered	Known only from the Baboquivari Mountains.	ROW is outside of known range.
Nichol's Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	Endangered	Dependent on limestone substrates in desert hills.	No habitat present.
FISH				
Desert pupfish	*Cyprinodon macularius*	Endangered	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	No habitat present in area.
Gila chub	*Gila intermedia*	Proposed Endangered	Small streams and cienegas; prefer deeper pools with cover.	No habitat present in area.
Loach minnow	*Tiaroga cobitis*	Threatened	Requires perennial streams with swift water over cobble or gravel	No habitat present in area.
Spikedace	*Meda fulgida*	Threatened	Requires perennial streams with swift velocities over sand and gravel.	No habitat present in area.
AMPHIBIANS				
Sonoran tiger salamander	*Ambystoma tigrinum stebbinsi*	Endangered	Stock tanks and impounded cienegas in San Rafael Valley, Huachuca Mountains at 4,000-6,300 ft.	ROW is outside of known range. This species is not known to occur in the Nogales RD.

APPENDIX D (*cont.*). Federally Listed, Proposed, and Candidate Species under jurisdiction of the U.S. Fish and Wildlife Service in Pima County, Arizona as of 14 August 2002, excluded from further consideration.				
BIRDS				
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey.	Winter surveys of Peña Blanca and Arivaca lakes were conducted in 1994, 1995, 1996, 1998, 2000, 2001, and 2002. No bald eagles have been observed.
California brown pelican	*Pelecanus occidentalis californicus*	Endangered	Coastal land and islands; species is found around many Arizona lakes and rivers.	No habitat present in area.
Masked bobwhite	*Colinus virginianus ridgewayi*	Endangered	Only known Arizona population has been reintroduced on Buenos Aires Natl. Wildl. Refuge	ROW is outside of known range.
Mountain plover	*Charadrius montanus*	Proposed Threatened	Open arid plains, short grass prairies, and cultivated farms.	No habitat present in area.
Northern apolomado falcon	*Falco femoralis septentrionalis*	Endangered	Grassland and savannah habitats.	No recent confirmed reports for Arizona.
MAMMALS				
Ocelot	*Felis pardalis*	Endangered	Prefers humid tropical & sub-tropical habitats; typically found at higher elevations.	ROW is outside of known range.
Jaguarundi	*Felis yagouaroundi tolteca*	Endangered	Deciduous forests, riparian areas, swampy grasslands, upland dry savannahs, etc.	ROW is outside of known range.
Sonoran pronghorn	*Antilocapra americana sonoriensis*	Endangered	Grassy desertscrub in northwestern Sonora and adjacent Arizona borderlands, mainly Yuma Co.	ROW is outside of known range.

STATUS DEFINITIONS: ENDANGERED SPECIES ACT
Endangered: Imminent jeopardy of extinction.
Threatened: Imminent jeopardy of becoming endangered.
Proposed: Proposed Rule has been published in Federal Register to list as Threatened or Endangered.